ENGINEERING AND MINING JOURNAL

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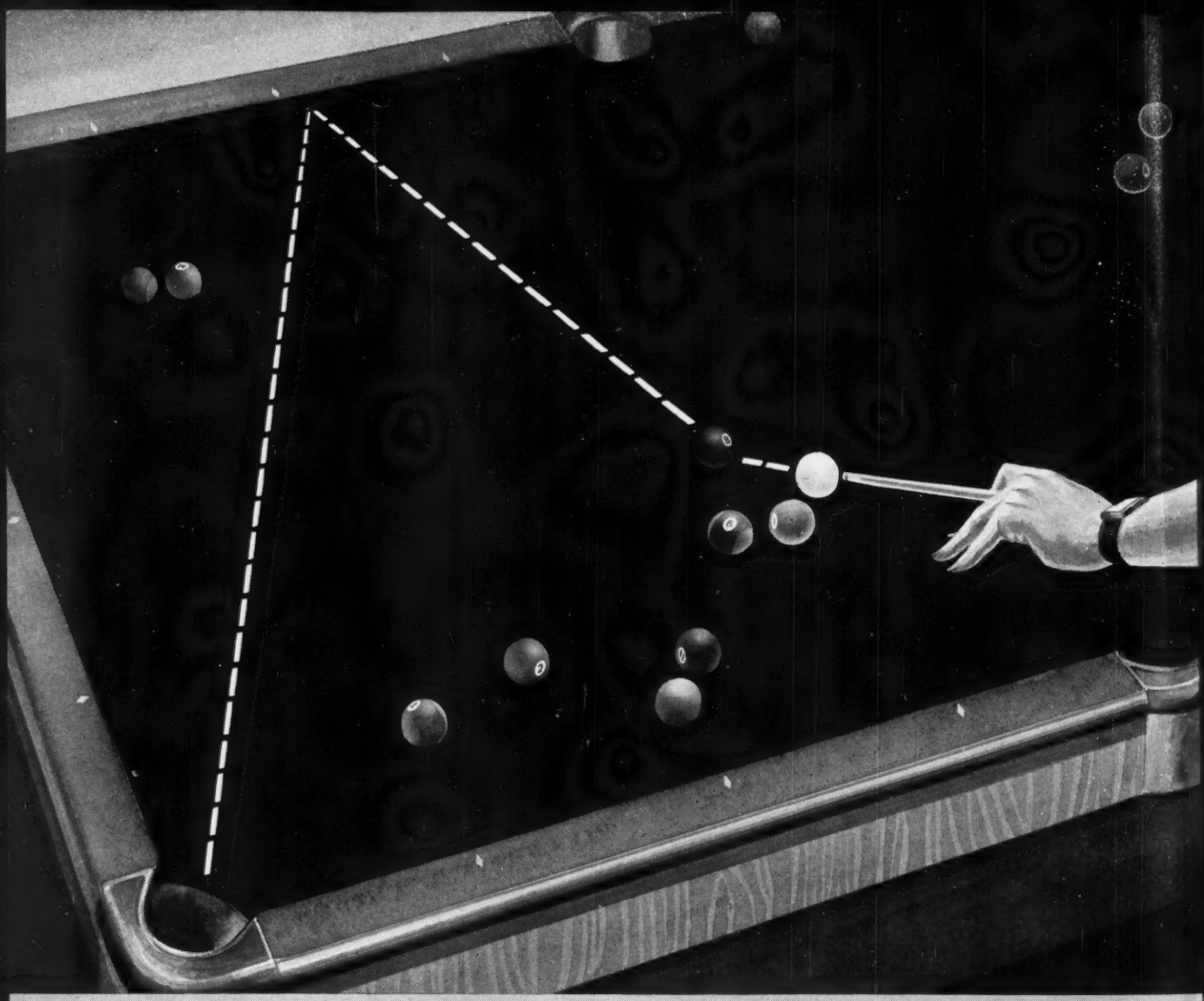
Open-cut mining yields the bulk of our iron and copper. (A composite picture.)

Reconversion Will Be Different SEE PAGE 54



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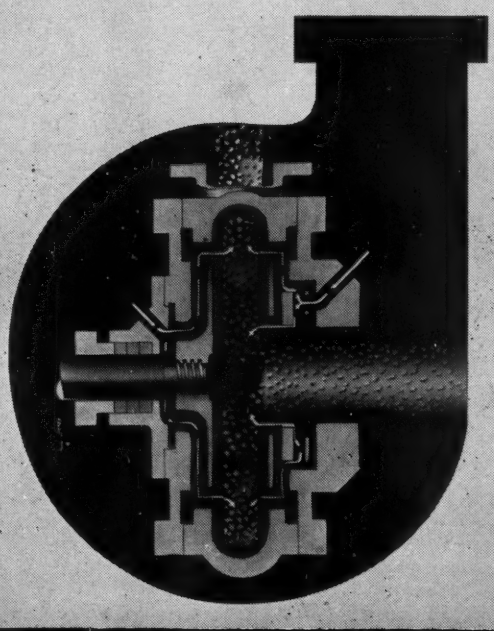

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HYDROSEAL ABRASIVES AND CORROSIVES MATERIALS HANDLING PUMP

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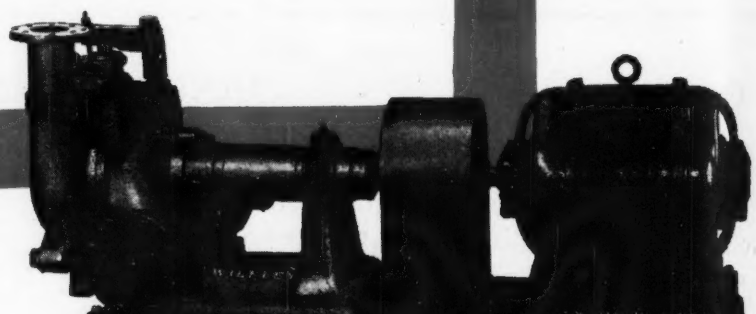

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WHAT DOES AMERICA WANT?

IT IS THE PURPOSE of this editorial, the thirty-first of a series, to state the urgent need for a clear declaration of American policy in world affairs.

Within the past few weeks there has been a wakening conviction in this country that the determination of international arrangements cannot safely be put aside until victory has been won. For we have seen actions taken in Europe seemingly without full consultation and agreement of the Allied powers, which may profoundly affect the design of the post-war world.

A declaration of American policy is needed, and it should be accompanied by a statement of our firm intention to exert full effort to procure its acceptance and furtherance. Emphatically, this does not mean that an American platform should be put forth as an ultimatum, which other nations must accept totally, or reject at the cost of having the United States withdraw from collaborative participation in world agreements and organization. On the contrary, the first plank in such an American platform should be a firm commitment on our part to participate with our associate nations in building a general system of world security and order. By definition, this requires that each participant be willing to accommodate its purely national interests to a program that can be accepted as fairly representing the interests of all. But equally, there is imposed on each participant an obligation to state honestly and openly what it conceives its individual interest to be, as well as its concept of what measures will best serve the general interest.

☆ ☆ ☆

Americans have displayed a singular diffidence in the matter of formulating a bill of American objectives—singular, in that it contrasts so sharply with our power to exercise as broad a leadership as we are able to define. This reluctance stems partly from the inherent difficulty of arriving at a coherent statement of national aims in a country like the United States—so vast in area, so multiple in its sectional and group interests, and so soundly committed to the free expression of individual thought. But it stems also, in part, from a tradition of national isolation which, however understandable in historic perspective, now stands clearly discredited by two world wars which were not of our making, but from which we were unable to hold aloof.

That the economic wellbeing and political security of the rest of the world is closely bound to the decision and performance of the United States is questioned nowhere but in America. Political boundaries and restrictions cannot build effective fences against the interplay of economic forces, and the sheer weight of American economic influence is of crucial import to all the other nations of this globe. In large measure their decisions will be shaped either in response to the opportunities that our procedures offer them, or in defense of interests that our procedures may jeopardize.

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The United States contains only about 6 percent of the world's population. But—our national income, before the war, amounted to almost 25 percent of world income; our industrial output as a whole approximates 45 percent of world totals, and we now are producing a like percentage of the world's munitions; we have 35 percent of the world's railroad mileage; 25 percent of merchant fleet tonnage; 50 percent of the world's telephones; 45 percent of steel production; 40 percent of aluminum production; 33 percent of coal output; we are refining (though part of the production comes from imports) 55 percent of the world's copper, and 70 percent of its petroleum; we now are producing 50 percent of the world's rubber (though post-war resumption of natural rubber production will sharply reduce this balance); our shares of agricultural production are, of course, much smaller, but just before the war we accounted for 35 percent of world cotton production, 15 percent of wheat, and 10 percent of wool.

Whether we like it or not, we must exercise political responsibilities commensurate with the weight of our economic power in an inter-dependent world. But before responsibilities can be assumed, they must be defined. Can the United States arrive at a clear agreement and statement of aims for which it is willing to stand sponsor?

The recent campaigns of both political parties have helped to provide an encouraging answer. In general, election mandates are glaringly deficient as indicators of a unified national purpose. A majority of voters declare themselves for the winning candidate. But even among the majority there are varying degrees of enthusiasm for the platform principles espoused by their candidate; and the substantial minorities of the defeated parties may have had no enthusiasm whatsoever for particular planks in the winning platform, or for the platform in its entirety. A sportsmanlike deference to the will of the majority is a feeble substitute for unified national conviction.

But this Presidential campaign was noteworthy for certain basic principles upon which both the platforms and the candidates of the major political parties were

united. Surely, upon such areas of agreement there may be said to have been an American mandate; the more so, because upon certain of them, we have evidence that no party or candidate could have declared opposition with any hope of victory. What then were these agreed-upon principles? The following is an attempt at a fair summary:

1. That America, in collaboration with its Allies, is committed to seeing the war through to the unconditional surrender of our declared enemies.

2. That America is committed to a responsible role in a world security system after the war, including a commitment to lend the support of our armed forces to repel aggressions that may violate such security.

3. That America is committed to the post-war goal of substantially maintaining in this country an economy that will provide jobs for those who are able and willing to work.

4. That America is committed to the principle of achieving this goal of sustained, high-level employment of manpower and economic resources under a system primarily activated by competitive enterprise.

These are American mandates. They can be made the nucleus of a coherent national policy, for they define aims upon which the great majority of our people are emphatically agreed. But no one can pretend that in this generalized form they serve as more than directional guides for either internal legislation or international negotiation. This skeleton of aims must be clothed with the living flesh of agreed-upon means. Here we have no national mandates of comparable clarity, but it is patently clear that it is our compelling task to achieve them.

☆ ☆ ☆

On our elected representatives in government rests the primary responsibility for formulating the specific programs required to implement national policies. Under our system of government, those representatives need continuous nourishment in the form of mandates as to what the people want. Particularly during a period when so many urgent problems are being thrashed out upon an international basis, this imposes a grave responsibility upon all sectors of our citizens; for it requires them to think in terms of the welfare of our nation as a whole, to focus upon those points which offer possibilities for substantial agreement among Americans, rather than upon matters of individual, group, or sectional advantage.

In earlier editorials I have tried to define a basis for national policy in keeping with that broad purpose. They have dealt with problems that are basic to the healthy functioning of free enterprise under the competitive system, with the mobilization of our resources for war and for reconversion to peace-time production, with labor and management responsibilities and relations, with national debt and taxation, with foreign trade and our economic relationships abroad, with the industrial development of backward areas. Since they have been presented in the McGraw-Hill publications, which reach a group broadly representative of all American industry, they have centered upon problems that have an economic rather than a strictly political import.

Future editorials, to appear during 1945, will deal with comparable subjects selected in recognition of the urgent importance for arriving at concerted definitions of national policy. I am fully aware that no individual or group can speak authoritatively for the American Nation. But I hope that an honest attempt to formulate sound concepts of national interest in crucial economic matters will help to crystallize American policy both by focusing agreement and by eliciting dissent.

☆ ☆ ☆

Here there is space only to indicate in broadest outline what I conceive to be desirable foundations for an economic policy for the United States:

1. The attainment of a high and sustained level of business activity and employment in the United States and in the world.

2. Active and expanding markets for world trade based upon fair competition rather than upon bloc agreements, discriminatory preferences, and cartel arrangements.

3. The encouragement of industrial development in nations that have been backward in that respect.

4. A recognition that hospitality to imports, rather than constituting a threat to national standards of living, offers in fact the most potent instrument for international bargaining that any nation can command.

5. A willingness to assume a responsible national role in international arrangements designed to provide such financial stability as may be needed to support mutually advantageous world exchange of goods and services.

We must see to it that the end of military warfare does not merely open the door to an era of economic warfare.

The fact is that America has no choice but to assume leadership in world affairs. For the weight of our influence will be felt by other nations no less whether our attitude be positive or negative. And the cost to us of any international obligation which we might undertake must in all fairness be weighed against the equally real cost to us of dealing with measures that others may take to protect themselves against the results of our non-participation.

We have tended in the past to approach international commitments timidly, fearful that we might be outwitted in a world battle of wits. And in so doing, we have too often ceded to others the initiative of suggestion, leaving to ourselves the thankless task of accepting or rejecting what they demand of us.

Our one bargaining weakness stems from the fact that other nations, by contrast feeble in potential power, know what they want and are able to mobilize all their strength to achieve it.

America can be the most effective nation on earth—if only it knows what it wants.

President McGraw-Hill Publishing Co., Inc.

THIS IS THE 31ST OF A SERIES

ENGINEERING AND MINING JOURNAL

Evan Just, Editor

Western Mining Holds for Free Enterprise

THE EDITOR has just finished an extensive Western tour, made primarily to exchange views on the following subjects with mine operators:

1. The necessity of industry leaders taking a more active interest in national and international mineral problems to avoid the common experience of having government policy affecting mining decided without competent advice.

2. The need for disseminating facts as to our mineral potentials in order to prevent the exaggerated views of have-not-ism now sweeping the country from resulting in repressive and unconservational national policies.

3. Search for a new tariff formula that will meet demands for expanding trade but afford domestic mining the protection needed to avoid serious dislocation.

4. The stake of gold and silver mining in the international drift toward fiat money, due to public ignorance of and indifference toward currency problems.

5. The importance of settling the differences between management and labor, so that they can unite in meeting problems in which they have a common interest.

6. The need for something to be done to encourage discoveries of new mines.

7. Ascertainment of the operators' attitude toward stabilized prices, premiums, and other controls.

The results of these conferences will be forthcoming in future issues. However, to give a quick summary of operator attitudes, they displayed notable open-mindedness, a hunger for reliable information on economic problems, and a great desire to preserve the free-enterprise system.

In the matter of labor relations, certainly nobody will contend that there is not room for improvement. Nevertheless, by and large, the reasonable and realistic attitude shown toward labor was heartening, and bodes well for the solution of future problems.

Contrary to some views, the men of the West are not isolationists. They are quite willing to hold up their end of our national destiny and obligations, simply insisting that the burdens and benefits of changed conditions must be equitably distributed. They do not intend to let the West be treated as a colony. Furthermore, considering the small portion of consumer prices which goes into raw-material costs, they do not intend to have the raw-material industries be the "goats" of new policies designed for the exclusive benefit of manufacturers and distributors.

Most of all, these men are tired of bureaucratic controls over their operations. They are sick of government meddling with the wage-price structure, the interminable haggling with the quota committee over operating costs, the incessant form filling, and all the other features of our drift toward totalitarianism. They are quite willing to forego any such benefits as premiums and subsidies, as soon as the exigencies of wartime permit, to get rid of the gigantic octopus which Uncle Sam threatens to become. In short, they are prepared to take their share of the "gaff" necessary to restore a government based on Jeffersonian principles.

"Power to them" say we.

Give the Investor a "Run for His Money"

AT THE RECENT CONFERENCE of SEC officials, state commissioners, and mining men in Butte (*E.&M.J.*, Dec., p. 110) the point came up repeatedly that in many cases investors in new mining enterprises simply do not get a fair "run for their money." This happens either through dishonesty or some form of incompetence. Whatever the cause, the results are unfortunate. Everyone conversant with mining knows that the risks inherent in mine development are great enough, without compounding them with avoidable risks. Experienced mining men who have examined defunct or struggling properties can cite cases where tunnels missed their objectives because of inadequate surveys; where mills were built before sufficient ore had been blocked out to warrant construction; where failures to reckon with stream pollution and tailing disposal resulted in abandoned properties; and where inexperienced operators gophered about ineffectually when obvious mineralized leads might have been

followed to better advantage. In all cases where ventures failed or suffered because of inexperience and incompetence, the investor did not receive a "run for his money," even though the conduct may have been entirely in good faith.

As long as such practices are conspicuous, the promotional efforts of honest, competent miners will be hampered by burdensome restraints designed for police purposes. Mining men present at the conference showed no sympathy for the reckless handling of investors' money.

The small mine or prospect must be financed; else unfortunate consequences to the mining industry and the nation will result. It is a matter for serious concern that Elmer E. Johnston, chairman of the legislative committee, Northwest Mining Association, estimates that SEC has prevented the financing of more than 13,000 Western mines which have reached a stage of development that would justify public financing.

Obviously, the industry must meet the SEC and state commissions half way by doing what it can to discountenance dishonesty and waste in handling funds solicited from the public. Any attempt to set up a code of ethics and procedure in handling new developments will be a step in the right direction.

Vital Job Well Done

H. DEWITT SMITH, executive vice president of Metals Reserve Co., subsidiary of the Reconstruction Finance Corp., resigned from government service on November 30 to return to private business.

Since joining Metals Reserve in October, 1941, Smith has been in charge of all the domestic, Canadian and Mexican activities of the organization. Metals Reserve has played a very important part in the procurement of strategic and essential minerals necessary for the war production program. When the United States declared war we were faced with potential shortages of a number of vital minerals. It became the job of Metals Reserve to get the necessary production quickly despite the encumbrances and delays due to government "red tape." To do this required the making of agreements and commitments verbally, the men of Metals Reserve assuring the producers that formal contracts would be forthcoming later. To accomplish this without running into intolerable complications required unusual know-how, integrity, and negotiatory skill. Without complete confidence on both sides, and such self-evident justification that embarrassing difficulties would not be raised during the formalization of commitments, the job of getting production on time could not have been done.

The task of procurement was accomplished in several ways. For certain minerals and districts special price schedules were set up, fitted in each case to the needs of the situation. In a great many cases individual contracts were negotiated. Special contracts were set up in connection with foreign production, both on commodity and individual bases. Metals Reserve also acted as the fiscal agency in stimulating domestic copper, lead, and zinc produc-

H. DEWITT SMITH

HISTORICAL SUMMARY: ENGINEERING AND MINING JOURNAL was founded in 1866 as the American Journal of Mining, the title being changed in 1869. The following publications have been consolidated with Engineering and Mining Journal: Coal and Iron Record (1875); The Mining Review (1877); The Polytechnic Review (1879); Mining and Metallurgy (1902); The Mining Magazine (1906); Mining and Engineering World (1917); Mining and Scientific Press (1922); Engineering and Mining World (1932). All rights to foregoing titles of consolidated publications are reserved by the publisher. . . . The following have served as editors in chief of Engineering and Mining Journal and its predecessor publications: G. F. Dawson (1866–67); R. W. Raymond (1867–74); R. W. Raymond and R. P. Rothwell (1874–89); R. P. Rothwell (1890–1901); D. T. Day (1901–02); T. A. Rickard (1903–05); W. R. Ingalls (1905–19); J. E. Spurr (1919–27); A. W. Allen (1927–33); H. C. Parmelee (1933–44); Evan Just (1944—). The Editorial Staff of Engineering and Mining Journal comprises: Evan Just, editor; H. C. Parmelee, editor emeritus; A. H. Hubbell, managing editor; J. B. Huttl and R. H. Ramsey, associate editors; H. H. Wanders, market editor; A. W. Knoerr and W. N. P. Reed, assistant editors; G. J. Young, consulting editor.

tion under the WPB-OPA Premium-Quota Plan.

To do all these tasks without arousing storms of jealousy and criticism demanded competence of a high order. In building his organization, Smith adhered to the principle of depending on quality rather than numbers to accomplish the objective. In contrast to typical government agencies, the organization has been kept small and great emphasis placed on obtaining well-qualified personnel. Given this class of assistance, the policy has been to give each man as much responsibility as he could carry. The wisdom of this course has been evident.

A native of Plantsville, Conn., Smith graduated as an E.M. from Yale University in 1910. After a few years as geologist for Spurr and Cox and for G. W. B. Fletcher, in Mexico and Santo Domingo, he became a shift boss for Kennecott Copper Co. at Kennecott, Alaska. Within three years he rose to the position of assistant manager.

In 1917 he became mine superintendent, later general superintendent, for the United Verde Copper Co. at Jerome, Arizona. Five years later he joined the technical staff of the New York Trust Co., and in 1928 became sales manager for United Verde.

In 1930 Smith entered the service of Newmont Mining Corp. as engineer and director. He was particularly active in Newmont's work in Peru and in connection with O'Okiep Copper Co., Ltd. After entering government service, Smith resigned all connections with private industry.

Besides having been a director of several Newmont affiliates, Smith has been a director of Phelps Dodge Corp. and of the A.I.M.E. He is a past president of the Mining and Metallurgical Society of America and of the Mining Club, New York.

In returning to private business he will resume activity with Newmont Mining Corp.

Smith's successor in Metals Reserve Co. will be Harvey J. Gunderson, also general counsel of Metals Reserve Co.

MILLING AROUND

People in the metal trades will be interested both as consumers and competitors in the claims made for the new group of organic compounds called "silicones" as permanent protective coatings for metals.

A reliable journal states that Nelson Rockefeller, new Assistant Secretary of State, will work aggressively to "develop" our tariff structure to improve markets in this country for Latin-American raw materials, such as copper, which can be produced more cheaply than here. Unless the State Department takes more pains than in the past to comprehend the problems of domestic mining, this statement probably forecasts some bitter wrangles over tariff policies. With domestic mining labor adequately organized to have a voice in tariff problems, the Department is likely to find it more difficult to "steamroller" through policies based on inadequate information.

Established gold mine operators throughout the West generally realize that their economic position has been worsened by increased costs since L-208 shut most of the industry down. Many could not resume operations under current conditions even if L-208 were rescinded and some others would only be able to mine developed high-grade ore. The smaller operators are particularly affected.

Many people do not understand that the present output of domestic mines does not represent their true capacity at present prices, wages, and supply costs. Both production and development are greatly impaired by manpower shortages.

The University of Colorado has started a new research involving the use of walkie-talkie equipment for communication between engineering parties establishing altitudes. This suggests the possibilities of walkie-talkies for exploration parties in rough country, and perhaps other uses in the mining industry.

At a recent test demonstration at the Willys-Overland plant, jeep power was used for such diversified tasks as spray painting; welding; sawing lumber; operating air-compressor equipment for chipping and riveting hammers, paving breakers, grinders, clay diggers, rock drills, and wood borers. A 500-gal. per minute pump operating off the engine of a fire jeep hurled water six stories in the air. What a versatile tool the jeep would be for that little old prospect up on the hill.

An eminent metallurgist who has recently toured Mexico thinks it has great mineral possibilities. He is optimistic over future trade relationships, particularly if American firms go in as partners, not exploiters. He praises the capability of Mexicans at various social levels, citing examples of their competence as craftsmen and in learning new skills.

Again we ask, What *is* Secretary Ickes up to in Alaska? The House Appropriations Committee recently turned down his request for no less than $3,760,000, which he wanted for preparing a plan to develop the Territory. What a noble development he must have in mind, if the plan alone would cost such a handsome sum!

THIS TIME

Stockpiling by war's big customer, the Government, has been accepted by practical men charged with the job of marketing metals. This is evidence of the long distance that we have moved since 1918.

Reconversion Will Be Different

H. H. WANDERS
Market Editor

IF THE FIRST World War moved a mountain of metals before it ended in 1918, it is obvious that the current war has already moved two mountains, perhaps even three. Consequently, some observers argue, the job of reconversion will be just so much larger and more difficult. However, this gloomy view may prove to be as far from the mark as the ideas entertained by the optimists who believe that the needs of the world when this war ends will be so great that surpluses will disappear like snow on a hot griddle.

The world is absorbing twice as much copper in this war as in the period of high productivity in the 1914–1918 period. Aluminum production has been raised to unbelievable heights. Steel plants of this country produced 263,000,000 tons of steel ingots and castings in the three-year period following Pearl Harbor, or nearly 80 percent more than the tonnage produced in the best three-year period of the first World War. Iron ore required to produce this staggering total exceeded 320,000,000 tons.

Producers of copper and other war metals are groping for a picture of what lies ahead. The cold statistics clearly show that the magnitude of the supply problem in this war is such that conclusions drawn from the behavior of the markets during and after the first World War are dangerous. They will be wrong unless full weight is given to the extraordinary changes that have taken place in all aspects of war production, which, in the case of metals, virtually start with the mine and end with the finished product. In fact, it is debatable whether any of the lessons learned in the four years following 1918 can be applied to fit into the present far more complex situation.

The present war brought swift action aimed at regulating the country's economy. This was done to avoid price dislocations and to direct needed supplies into war plants. Whenever it appeared that available supplies of metals or other basic commodities might be inadequate, the government stepped in with funds and whatever else would be required to bring out added production. Direction of the materials program was taken over by the government, which was not the case over much of the period between 1914 and 1918. Reserves were built up—now referred to as stockpiles—and so far few bottlenecks have been encountered in providing the basic materials essential for the war effort. The crippled but not dead law of supply and demand was kicked out of the window, and producers of war materials had no great trouble making ends meet.

Authorities in Washington purchased tin concentrate in Bolivia at 60c. a pound of tin contained, f.a.s. South American ports, shipped the material to a government-owned smelter in Texas, processed it, and sold finished Grade A tin to industries engaged in essential work at 52c. This is accepted as good total-war economics, but nothing like it was heard of in the first World War.

Final compilation of world statistics for recent years, when available, will probably show that copper output since the first World War has increased at least 97 percent; lead output, 45 percent; and zinc output, 107 percent. Gains in production of these metals (mine output) occurred largely outside of the United States. Consequently, the job of restoring a balanced economy in metals will be of vital importance not only to the United States but to South American, Mexican, Canadian, Australian, and African sources. Russia, operating in a more or less closed economy, is expected to figure as a buyer rather than seller of major non-ferrous metals.

Price behavior during the first

RECONVERSION LESSONS FROM THE FIRST WORLD WAR

1. Dislocations in national and international business relations were greater than first reports indicated.

2. Revival of world trade was a slow process, covering four years.

3. Monetary factors over which industry had no control exerted a strong influence on trade and prices.

4. Attempts at maintaining a high rate of industrial activity in a period of inflated costs proved unworkable.

5. Surpluses of basic raw materials were larger than first estimated.

6. Loans on commodities purchased at inflated war prices were not liquidated promptly, accentuating the decline that occurred in 1920 and 1921.

7. Labor held out for high war wages until it became obvious that deflation of the war economy applied equally to all cost factors.

8. As production of non-ferrous metals increased abroad, competition also increased, so much so that attempts by domestic producers to maintain prices in the face of weakness abroad ended in failure. Costs abroad were deflated more speedily than in the United States, owing to the need for foreign trade.

World War has been subjected to sharp criticism, and it probably is correct to say that the action of the markets in those days encouraged prompt enactment of price controls by Great Britain and this country as the present war spread over the world.

Copper Was Typical

To recite a bit of copper history, going back to 1916:

Some sellers in that year raised their asking prices to 36c. and 37c. a pound. This occurred at a time when production was pretty well sold up and leading factors were out of the market. Labor and transportation difficulties were encountered early in 1917 and complicated matters no end. Throughout this period of high prices, rumor had it that the government intended to take drastic action to correct the situation, possibly leading to the requisitioning of supplies and price fixing. This talk sufficed to ease prices. By agreement between the War Industries Board and copper producers, the price was fixed at 23½c., New York, Sept. 21, 1917. That figure looks high today, but costs in those days were sky high.

What some observers described as "chaos" followed closely on the heels of this attempt at price stabilization. Contract obligations had to be revised to meet the altered conditions, and the Copper Producers' Committee was formed to regulate the market. The business of distributing available metal was handled through the United Metals Selling Co. and the American Smelting & Refining Co., the first-named operating in the domestic market and the latter concentrating on export business.

Production costs continued to rise in 1918, and the problem of obtaining larger tonnages of copper caused the War Industries Board to reverse an earlier decision to maintain the market at 23½c. On July 2, the price was raised to 26c.

In reviewing the year 1918, *Engineering and Mining Journal* said:

"The armistice on Nov. 11 caught the copper producers with no very large orders on their books. Some large orders that were pending were, of course, suspended. A committee went to Washington on Nov. 15 and made an agreement with the War Industries Board for maintenance of the price at 26c., the producers agreeing to maintain production and wages. This agreement meant nothing more than official sanction of the producers concertedly asking 26c., and getting it if they could. They found that they couldn't. . . . Late in December the producers organized an export association under the authority of the Webb law, and announced an asking price of 23c. for the first quarter of 1919, but this was regarded as a feeler rather than as a real hope."

The supply situation outside of Central Europe and Russia was studied by members of the industry. Early in 1919, based on a report by John D. Ryan, head of the Copper Export Association, the surplus was placed at 272,500 tons of new copper and 192,500 tons of scrap, a total of 465,000 tons.

Copper was offered at 20c. per pound in January, 1919, and at 18½c. in February. Wage rates were a troublesome factor in bringing the market down to a more realistic selling basis. The United Metals Selling Co., representing the producers, agreed to sell approximately 50,000 tons of copper and whatever amount of scrap the War Department had to dispose of, the settling basis being the average monthly quotational price given in *E.&M.J.* The selling agency agreed that not less than 2,500 tons a month would be absorbed under this contract by the copper industry over a period of ten months, and then 5,000 tons a month for a period of five months.

Disturbed world conditions depressed prices rather sharply in all commodities throughout 1920. A specialist in metals, commenting on the price debacle, observed that markets were gathered up by forces stronger than themselves, and swept like leaves before the wind to a common destination. Whether it was copper, tin, lead, zinc, silver, rubber, sugar, silk, wool, wheat, corn, cotton, or leather, the results were the same —the money market dominated all other markets. Copper fell to an

PRICES—Then and Now

Yearly Averages in Cents per Pound (E&MJ)

	COPPER *F.O.B. Refinery*	LEAD *N. Y.*	ZINC *St. L.*
1914	13.602	3.862	5.061
1915	17.275	4.673	13.054
1916	27.202	6.858	12.634
1917	27.180	8.787	8.730
1918	24.628	7.413	7.890
1919	18.691	5.759	6.988
1920	17.456	7.957	7.671
1921	12.502	4.545	4.655
1922	13.382	5.734	5.716
1923	14.421	7.267	6.607
1939	10.965	5.053	5.110
1940	11.296	5.179	6.335
1941	11.797	5.793	7.474
1942	11.775	6.481	8.250
1943	11.775	6.500	8.250
1944	11.775	6.500	8.250

average of a little above 13c. a pound before the end of the year.

As 1920 ended it was clear that the washout in commodities had not yet run its full course. The following year, 1921, was viewed as "the worst that the copper industry has ever had or probably ever will have. At no other time since copper mining became an important industry have the mines been shut down for a year." The average price for 1921 was 12.502c., f.o.b. refinery, against 17.456c. in 1920. Foreign demand remained abnormally light. Domestic deliveries of refined copper amounted to 342,367 tons in 1921, which contrasts with 682,326 tons in the preceding year. Production of copper for the world in 1921 was estimated at 587,800 tons, against 1,041,806 tons in 1920.

The arduous job of balancing production and consumption finally bore fruit in 1922. The severe deflation in costs and prices brought a fair measure of stability and confidence into the market. Surplus stocks were no longer a problem. Production at the mines was resumed and new copper came into the market in quantity by the middle of the year. The year opened with copper at 13½c. New York, and ended with the metal at 14½c.

This brief recital of what occurred in copper immediately after the first World War ended brings out clearly that the copper industry was helpless in restoring a healthy market for the metal, owing to the interplay of forces well outside of the industry's control. This same review, with modifications, would apply with force to most of the basic commodities.

The war industries moved toward reconversion after 1918 with little or no comprehension of the dislocations that had taken place throughout the world and the forces that blocked a speedy and healthy revival of trade.

A large segment of the world's normal volume of business could not be restored swiftly because of credit difficulties and monetary uncertainties. In some instances, as in the case of defeated Germany, the credit and monetary mechanisms had to be completely reconstructed, a time-consuming job. Deflation finally was permitted to run its natural course.

Wars are conducted by governments, and sound economics necessarily play no part in waging a life and death struggle. Producers of metals after the first World War could not resume normal operations until the war economy was completely purged from the business system and confidence again revived to stimulate the flow of trade.

Government in Business

Modern governments have taken it upon themselves to maintain a high degree of general business activity. They have intervened to control prices and direct production while war is waged. It follows that, with political expediency added to the broth, government can scarcely be expected to stand aside and take no part in supporting business activity during periods of stress and uncertainty.

The job of reconversion will be colossal. The very magnitude of the war program makes this obvious. The utmost in cooperative effort will be needed to bolster business confidence and to provide work in the mines and factories of this as well as other countries.

Those who may still believe that the history of reconversion from war to peace must repeat the pattern of 1918–22 are ignoring the extent by which the element of government intervention in business has altered and will alter the course of events.

OUTPUT—Then and Now

In Tons

COPPER

	1918	*1943*
United States	968,000	1,114,000
Mexico	83,200	50,000
Canada	58,000	289,500
Chile	106,400	548,000
Peru	49,000	35,500
Russia	(a)	(b)125,000
Japan	99,500	(b)100,000
Africa	34,200	470,000
Elsewhere	158,700	338,000
Totals	1,557,000	3,070,000

(a) Negligible. (b) Conjectural.

LEAD

	1918	*1943*
United States	556,200	446,350
Mexico	97,500	209,300
Canada	25,700	222,200
Spain	187,000	41,600
Australia	186,700	(a)
Elsewhere	259,400	(a)
Totals	1,312,500	(a) (b)

(a) Not available. (b) World production in 1939 was 1,898,800 tons.

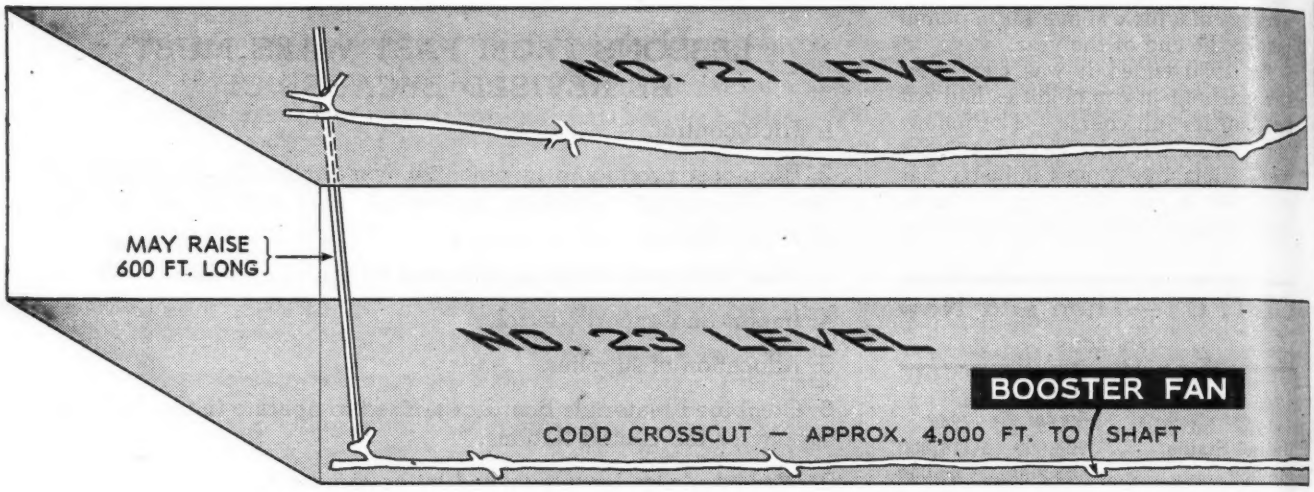
ZINC

	1918	*1943*
United States	525,200	(a)941,900
Canada	12,600	206,500
Mexico	.....	(b)50,000
Great Britain	43,000	(c)
Germany	189,500	(c)
Japan	44,000	(c)
Elsewhere	128,300	(c)
Totals	892,800	(c) (d)

(a) Slab zinc from foreign and domestic ores. (b) Slab zinc. (c) Not available. (d) World production in 1939 was estimated at 1,851,300 tons.

LESSONS FROM PAST WARS MUST BE REVISED BECAUSE OF:

1. Price control.
2. High-cost producers of essential war materials subsidized by the government. Product purchased and distributed by the government.
3. New plant and facilities financed by the government.
4. Import and export control.
5. Allocation of supplies.
6. Combined Materials Board organized to operate in the fields of supply for the United Nations.
7. War surpluses largely owned by government.
8. Governments the world over so deeply intrenched in economic activity that reconversion necessarily will be a task calling for close collaboration between business and government.
9. Management of currencies.
10. Lend-Lease.



Spot Coolers Increase Comfort of Mine Workers

URIE E. BROWN, *Chief Mining Engineer, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho.*

WHEN THE No. 1 shaft of the Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho, was extended to the No. 23 level, rock temperatures of 86 deg. F. and humidities of 96 percent presented a ventilation problem. Even after a raise from the No. 21 level (designated as raise *A* on the accompanying illustration) had been opened, admitting 12,000 cu. ft. of air per minute to the level, conditions were little improved.

A Carrier spot cooler was installed early in 1942 to improve ventilation conditions for scheduled development work on the No. 23 level which included the driving of the 4,000-ft. Codd crosscut and the 600-ft., 3-compartment May raise.

Cooling equipment consisted of a self-contained, reciprocating, 4-cylinder Freon compressor with steel base and duplicate condensers, high- and low-pressure controls and accessories, with aerofin direct-expansion copper air-cooling coils. The compressor was driven at 800 r.p.m. by a 30-hp., 220-v. G.E. induction motor. Air was drawn through the cooling unit by a TM-8 Coppus blower, and driven to the working face through a 15-in. metal duct. Joints in the duct were sealed by wrapping them with canvas strips coated with a slurry of cement. This excellent joint cover was not affected by the warm and humid atmosphere.

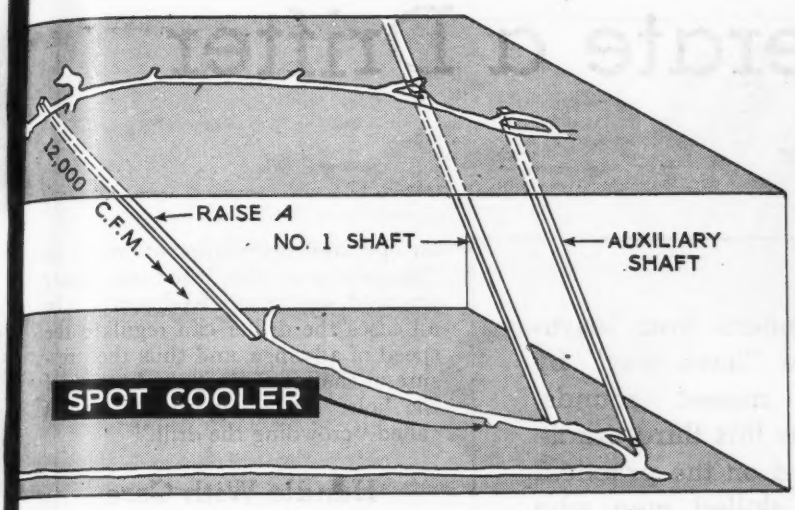
As soon as the equipment was placed in operation, walls of the crosscut became cool and dry, and working comfort improved. Although actual temperatures were not greatly reduced, the relative humidity dropped from 96 percent to 84 percent. As the crosscut advanced, friction in the duct became too great for one fan to deliver the necessary volume of air to the face. A second TM-8 blower was installed in the line about 2,400 ft. from the cooler.

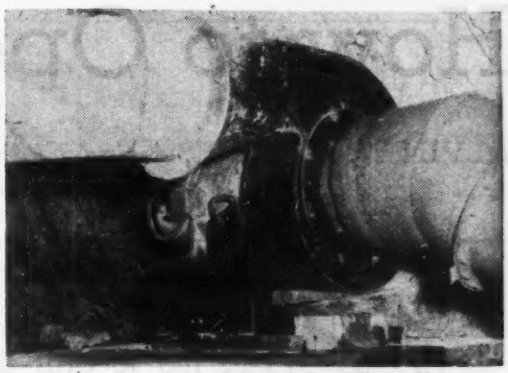
After completion of the crosscut, the May raise was started in September, 1942, and completed in December, 1942. Approximately 3,500 cu.ft. of air per minute was delivered to the advancing raise face through more than 4,000 ft. of duct. Discomfort at the face caused by high temperatures and humidities

Spot Coolers Lowered Temperatures and Humidity

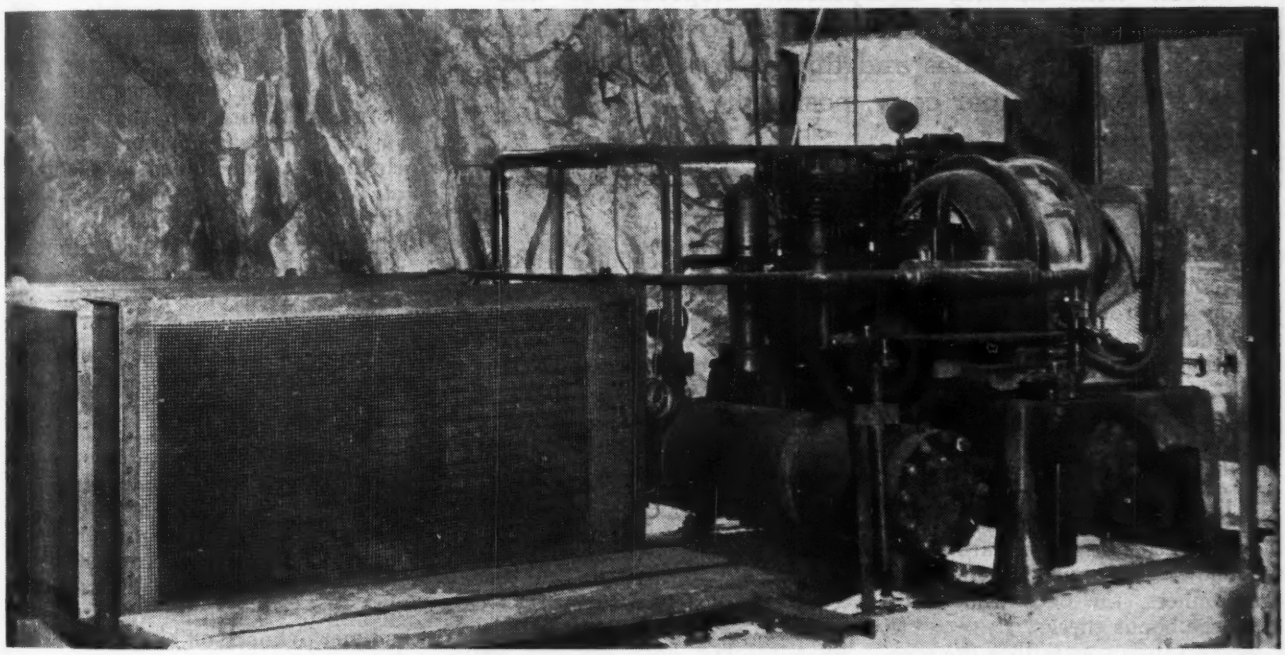
Place	*Vol., Cu. Ft./Min.*	*Wet Bulb Deg. F.*	*Dry Bulb Deg. F.*	*Rel. Hum., Percent*	*Abs. Hum. Gr./Lb. Dry Air*	*Moist.* Content, Grains*
No. 23 level when first opened	.....	86	87	96	...	.....
No. 23 level after raise *A* was opened, at cooler.	3,500	84	85	96	176	43,000
Codd crosscut after spot cooler was installed	.....	78	82	84	...	.....
May raise after spot cooler was installed	3,500	75	80	79	123	30,000

* Weight of water in 3,500 c.f. of air.





BLOWER (above) draws air through screened box (below) inclosing aerofin copper coils containing refrigerant supplied by compressor of adjacent cooling equipment.



was eliminated to a material extent.

The beneficial effect was due chiefly to the reduction of water vapor in the air. See table of temperatures and humidities. The cooler received 3,500 cu.ft. of air per minute containing 176 grains of moisture per pound of dry air (absolute humidity), and delivered air containing 123 grains per pound to the raise. This reduction of total moisture content from 43,000 to 30,000 grains per minute is equivalent to 320 gal. per 24 hr. Reduction in heat content for 24 hr. is equivalent to heat absorbed by the melting of about 15 tons of ice.

During 1943 and 1944 the installation has been used with equally satisfactory results in two other long crosscuts and two large areas. A second installation was added for ventilation on a series of drifts and sill floors on the No. 23 level.

DRY BULB—WET BULB

RELATIVE HUMIDITY is expressed in percent, and is the ratio of moisture present in a given volume of air to the maximum amount of moisture that volume could contain under existing conditions.

A sling psychrometer, consisting of two thermometers mounted on a light frame which can be whirled by hand, is used to measure relative humidity. One thermometer bulb is covered with a moistened wick (wet bulb); the other is not (dry bulb). A whirling motion causes the moisture in the wick to evaporate and thus lower the temperature reading on the wet bulb thermometer. Evaporation and cooling are only slight in humid air, and more pronounced in dry air. Thus by comparing wet bulb and dry bulb temperatures, taken simultaneously, it is possible to determine relative humidity. Tables showing humidities for various combinations of wet bulb and dry bulb readings are used to simplify the determination.

Moderately high temperatures can be comfortable if accompanied by low humidities. When both temperature and humidity are high, perspiration does not evaporate fast enough to dissipate body heat generated by exertion. Consequently, discomfort ensues.

Spot cooling units including fans improve conditions by lowering temperatures and humidities, and by supplying an appreciable air current to the working face.

How to Operate a Drifter

ALVIN W. KNOERR, *Assistant Editor*

To spare beginners from learning to drill the "hard way" by mistakes and missed rounds, E.&M.J. presents this third article of a series based on the practical suggestions of skilled men who work with mining equipment. Reprints of this article and previous ones discussing the operation of flotation machines and thickeners are available at fifteen cents per copy, postpaid.

SOME OF THE FINEST drill runners work smoothly and systematically pulling 7-ft. rounds or better shift after shift. Other miners seem to be operating in a constant mess of stuck steels, leaky water hoses, falling set-ups, and skinned knuckles, with only a 3-ft. round full of bootlegs to show for all their efforts. As an apprentice miner or chuck-tender, you can put yourself in either class, depending on whether or not you are willing to follow the advice of successful drift miners, the ones who collect the large bonus checks.

Add to their suggestions the operating tips of shifters, foremen, drill repairmen, field engineers, and drill manufacturers, and you will find that operating a drifter is neither mysterious nor complicated.

Know Your Machine

Unless you know what's going on inside of your machine, you cannot operate it to best advantage. So your first bit of advice is: Know your machine! Briefly stated, a drifter costs about $300 to $500, and weighs from 125 to 200 lb. Blasts of air at pressures of about 90 lb. per square inch drive a 3- to 4-in. piston which delivers nearly 2,000 powerful blows per minute directly against the shank of a drill steel, or through a tappet or hammer. Compressed air enters the drill through a throttle valve in the backhead, flows into the cylinder through an automatic valve, and leaves the cylinder through a port after having driven the piston. Glance at the drawing shown here to get an indea of the drill's "innards." Drilling speed is controlled by setting the throttle valve at positions varying from quarter to full throttle.

The steel is not only hammered, but it is also rotated by the drill. A grooved rifle nut in the piston meshes with the spiral flutes on the end of the rifle bar. As the piston moves forward, it twists the rifle bar a fraction of a turn to the left. On the return stroke, the rifle bar is held by a ratchet, and thus the piston is forced to rotate to the right. Straight flutes on the front end of the piston rotate the chuck nut and a series of other chuck parts, and finally the shank of the drill steel held in the chuck jaw.

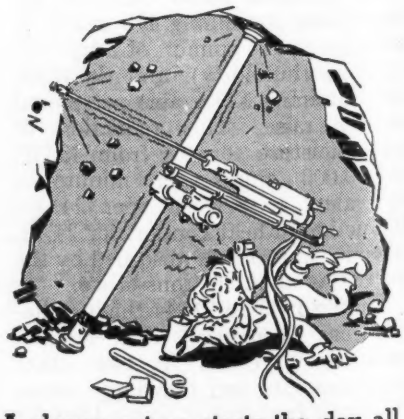
Cuttings are washed away from the drill bit by a stream of water which enters the backhead, travels through the water needle (or water tube) in the center of the drill, and is jetted into the hole in the center of the steel. If this stream doesn't flush out the drill cuttings, the throttle valve can be set to block the exhaust port. This causes a blast of compressed air to travel around the front end of the piston and through the center of the steel to the bit. In some drills, a steady stream of air "blows the hole" while the drill runs.

In light machines, a hand crank rotates a feed screw which pushes the drill forward. In other designs, an air-operated feed motor mounted on the shell or on the drill turns either the feed nut or the feed screw. In all cases the driller can regulate the speed of advance, and thus the pressure of the bit against the bottom of the hole. Speeding up the feed is called "crowding the drill."

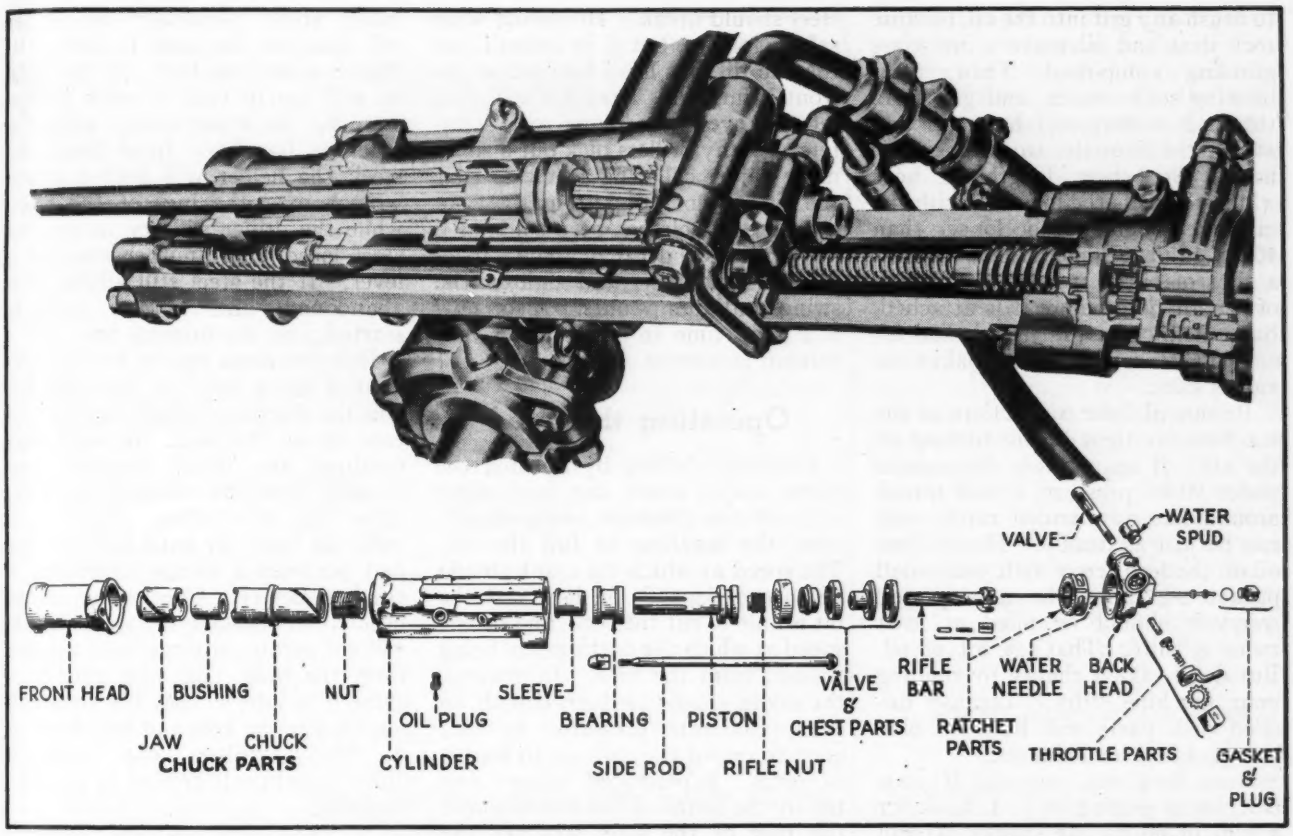
Handle With Care

Remember, your rock drill is a carefully designed machine with many parts constructed of alloy steels, heat-treated to just the right hardness, and machined or even honed with a precision that would do justice to a watchmaker. Some of the parts are machined to tolerances of 0.0002 in. and move 2,000 to 4,000 times a minute. Knowing this, you certainly wouldn't imitate the miner who forgets to lubricate, who drops his machine from the crossbar into a puddle of muddy muck, or who pounds his machine with a chuck wrench to loosen a stuck steel.

Now let's get to work. The small equipment which you and your chuck tender carry to the face consists of a chuck wrench, an oil bottle full of clean oil and capped tightly to keep out dirt, a pocket oil can, a 10- to 12-in. wrench, a rack full of sharp bits, plenty of clean waste, a soft hammer to knock off bits, a small can of graphite grease; and don't forget a small pocket first-aid kit, because when you work with steel and rock at close quarters, it is pretty hard not to get nicked a bit. If you work in a



A sloppy set-up starts the day all wrong.



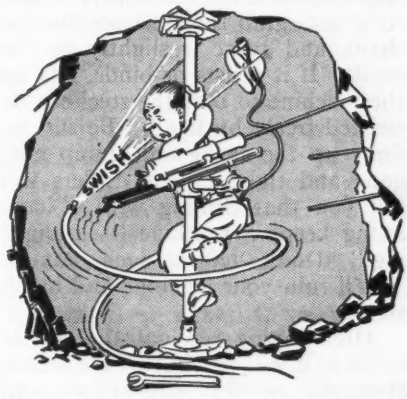
The drifter—built with a watchmaker's precision, but stout enough to strike sledge-hammer blows.

small mine where spare machines are not always handy, you should also have a spare water needle, gooseneck, hose-spud rubbers, water-tube rubbers, and perhaps a side rod. Then you won't have to hunt up the nipper every time your machine goes haywire.

"First I make my working place safe, and then if I have any time left, I give it to the company." That's the advice of one old-timer to a green helper, and it's worth remembering. When you arrive at a clean face, your first job is to make sure that all misfires have been shot out, and that the face, ribs, and back have been barred down. As a double check, don't forget to sound the back with a pick handle. A hollow, drummy sound means danger and loose slabs. In such cases, always bar down or stull up to prevent rock falls.

A Good Set-up Pays

Your outfit could consist of a jumbo-mounted, power-feed job; but to bring out a few fine points, we'll do it "the hard way" by using a crank-feed, column-mounted drifter. So you and your helper will bring up a column with single jackscrew base, a crossarm with saddle and clamp attached, safety clamp, water hose, air hose, line oiler, pick, mall,



A disconnected air hose always hisses before it strikes.

shovel, blow pipe, tamping stick, drill steels, jackbar, scaling bar, wooden blocks, and wedges. Phew! Let's take five, pardner.

Don't start the day all wrong with a sloppy set-up. First plant a 3x4-in. footblock 18 in. long squarely in the center of the drift about three ft. from the face. Do not use heavy blocking under the column, because this will prevent dropping your machine low enough to drill flat lifters. While your helper holds the column plumb on top of the footblock, place a 4x6-in. or 6x6-in. headblock about 18-in. long on top of the column cap. Place wedges carefully between the headblock and the back so that when the column is jacked up, the column cap will press evenly throughout all parts of the headblock. It pays to be fussy about this detail, because if the headblock is not wedged right, it will fall out while the drill is running, and you might have to crawl out from under a collapsed set-up, if you are able to crawl at all. The column is usually jacked up with a 3-ft. jackbar, and should be "cinched" up often during drilling operations.

As the top holes are usually drilled first, have your helper attach the safety clamp to the column at chin height. Next, bolt the arm with saddle clamp attached to the column above the safety clamp. Now turn the feed crank on the drill until the machine is centered on the shell. This is for balance. Grab the rear of the shell while your helper grabs the front end, and raise it into position so that the bottom of the shell fits into the cone clamp on the saddle. While you hold one end of the machine, have your helper draw up the clamp nuts.

Attach the water hose to the water hose spud on the machine, but don't forget to flush out the hose and water line first. Then uncap the oil bottle and fill the oil reservoir in the cylinder of the machine. Be careful not

to brush any grit into the oil, because rock dust and oil make a first-class grinding compound. Then, after blowing scale, water, and grit from the main airline and hose, fill and attach the line oiler to the main air hose. The short length of hose which connects the line oiler with the machine should not be longer than 10 to 12 ft. Some drillers suggest a shot of oil in the end connection of the air hose before it is attached, but others claim that this is bad for cold machines because it makes the valves stick.

Be sure all hose connections at the machine are tight before turning on the air. If an air hose disconnects under 90-lb. pressure, it will thrash around like a wounded rattler and can be just as deadly. Finally, put oil on the feed screw with your small pocket oil can. The machine oil reservoir should be filled at least twice a shift. That's a lot of oil. But don't take a chance by running your machine "dry," because unoiled drill parts will burn to blue hardness in a few minutes.

Now, how can you tell if your machine is getting oil? 1. Look for a film of oil on the shanks of drill steel. 2. Hold a clean shovel to the exhaust; it should show a thin film of oil. 3. Some drillers watch the "fog" of the exhaust. No fog means poor lubrication. 4. If the machine is not oiled, it will heat, and the ratchet which turns the steel will stick. Stop the machine when you notice these signs. Finally, open the throttle slightly and idle the machine while the oil circulates.

Collaring the Hole

At last we're ready to start drilling. Smear a small dab of graphite grease on the threads of the starter steel. This will save a lot of pounding to remove bits later on. Attach a starter bit (largest gage), insert the starter in the chuck jaw, swing the machine into position, and have your chuck tender draw up the saddle and cone-clamp nuts. These are generally called the dump and swing nuts because they regulate those motions of the machine.

When collaring the hole, crank the bit against the face, open the water valve (but don't drown the chuck tender) and start drilling at about quarter throttle. Some drillers prefer to collar a hole dry. If the rock face is hard and smooth, the bit will dance around, and the chuck tender will have to steady the steel with a chuck wrench. Never let him hold the steel with his hands, because he might injure himself, especially if the steel should break. He should wear safety goggles, but if he doesn't, see that he tilts his head forward so the front brim of his hard hat will protect his eyes from flying rock splinters. Many drillers pick out a small niche before collaring a hole so that the bit will not jump around.

After the hole has been collared—i.e., drilled to a depth of about $\frac{1}{2}$ in.—stop the machine, and tighten the swing and dump nuts. Also, now is a good time to cinch up on that column jackscrew.

Operating the Feed

Continue drilling by opening the water valve, crank the feed screw with an even pressure, and gradually open the machine to full throttle. The speed at which the crank should be turned depends on how fast the bit is able to cut the rock, and on the speed at which the cuttings are being washed from the hole. In general, the crank should be turned with an even, moderate pressure. It isn't good to crowd the drill, or to feed it in jerks. Experienced miners can tell by the sound of the machine and the ring of the steel whether the drill is being fed at the right speed.

After the hole is 4 or 5 in. deep, stop and see if the machine is in line. As a test, grab the steel beyond the shank and twist it slightly to the right. If it resists or binds, line up the machine so that the steel can be twisted freely by hand. Be sure to draw up the swing and dump nuts good and tight. Some drillers will tell you that drilling with a loose swing keeps a machine "self-aligning." Don't follow such advice! You'll ruin your machine and break steels.

After having run out the starter as far as it will go, shut off the water, then the air (in that order), and withdraw the drill and steel by cranking the feed screw to the left. (Some miners use a neat time-saving trick. They allow the machine to run at quarter throttle, give the crank a spin to the left, and pull back on the air connection. The vibration keeps the crank spinning and the machine slides back.) From now on drilling with second, third, and longer steels is a matter of repetition, unless you run into soft or broken ground.

Slow up when you hit soft, loose, or ravelly ground. Otherwise the bit will plug, cuttings will not be washed from the hole, and gouge and grit will wedge the steel as if it were cemented. The machine will start to chug and the rotating ratchet refuse to turn. You now have a stuck steel. Generally the driller will beat on the steel to loosen it. This is a bad practice. If this fails, he will try to twist it with a pipe wrench. As a last resort, after the machine has been freed from the steel, the helper will hold a chuck wrench over the lugs of the steel, while the driller will try to pry the steel loose with another steel as a lever. If the steel still sticks, it is abandoned, and a new hole is started near the original one.

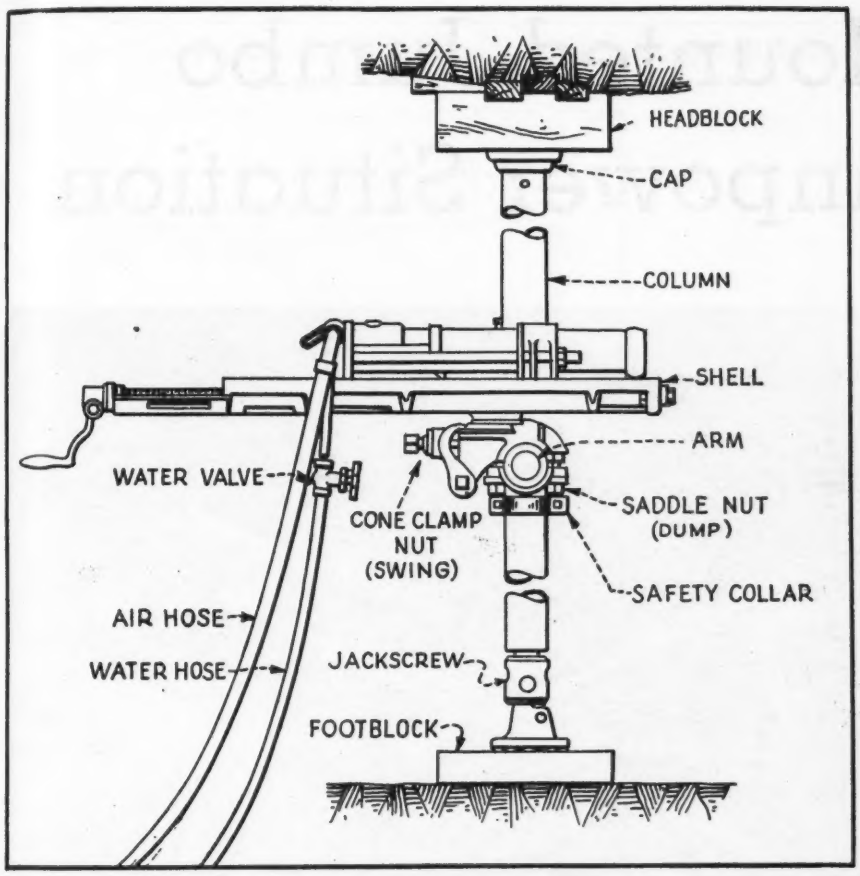
Here are some tips on how to prevent a stuck steel in bad ground: Cut the machine to half throttle and ease up on the feed. Be sure that cuttings are being washed continually from the collar of the hole. Blow the hole often. Don't drill with the same bit until it loses gage and becomes a wedge instead of a cutting device. Check the water needle. A broken or split needle will not permit cuttings to be washed from the hole. Be sure your machine is in line, so that the steel will not bind in the hole and help to plug it. Many drillers use partially dulled bits in soft ground to prevent plugging.

Check Your Steel

Now for a few words about drill steel. Never use a crooked steel or one with broken threads. Be sure that the water hole is not plugged. Check the surface of the shank end. It should be flat, circular in shape, and square with the sides of the steel. Never use a steel if the shank face is damaged—one that is cupped, crowned, or chipped—because it will ruin the tappet or piston. Do not set a steel down on its shank end. The dirt which sticks to it may plug the steel or gouge the chuck parts. Many drillers place unused steels in drilled holes in the face. In this way, the face serves as a drill rack, with steels out of the way, but always handy. Also, the driller can see how the drilled holes are "looking" when he figures out how to angle the rest of the holes in the round.

If steels break, find out why. Drilling with dull bits is a common cause. Maybe you are not crowding the machine enough. This causes the bit and steel to chatter, and often breaks the steel. Badly aligned machines are the greatest cause of broken steels.

The gage of starter bits is usually $1\frac{7}{8}$ in. to 2 in. Each change decreases by $\frac{1}{16}$ to $\frac{1}{8}$ in. Change to a smaller bit before a bit loses all of its gage. Start with the smallest bit possible, but keep in mind the



With headblock wedged right, jackscrew cinched up, clamp nuts tight, and machine lined up, we're set to go. Turn on the air, pardner!

number of changes needed to finish the hole. In some ground, a bit can be used to drill 15 or even 20 ft. In other cases a bit will drill only $\frac{5}{8}$ in. In fact, there is a mine up on the Iron Range where the rock is so hard, that after the day shift has worked all day to collar a hole, they leave a man underground who holds his finger on that spot to show the night shift where to start drilling. Use a soft hammer to knock bits loose, and don't forget that the bits have a left-hand thread.

Minor Repairs

Although drill doctors insist that a machine should never be taken apart at the face, even for minor repairs, such advice is possible only if spare machines are at hand. You may have to make a few minor repairs. If a water needle breaks or gets plugged, remove the plug from the backhead, pull out the old needle, and insert a new one. Replace the water-needle rubber, also. Clean all parts with waste before you replace them.

But hold on—you're not through yet! What caused that water needle to break? See whether the hole in the shank of the drill steel is properly punched. Maybe a shank diameter is too small. This will cause play in the chuck bushing, and break a water needle. Maybe you have plugged a shank by standing the steel on the shank end. Broken, split, or plugged water needles permit water to wash oil away from moving parts.

Sometimes a side rod breaks. This is a simple repair. But again, what caused that rod to break? If the lugs on the steel are too long, they will hit against the chuck jaw. This not only breaks the side rods but damages the front head. Both side rod nuts should be drawn up with equal pressure, otherwise the chuck and bushing may heat up.

When lowering the machine to drill a new set of holes, release the safety clamp and bolt it at the desired position on the column, usually midway for breast holes. Then release the column clamp slightly, and swing the arm forward and backward. This will cause the arm and machine to "walk" slowly down the column until the safety clamp is reached. Releasing the column clamp bolts too much may cause the machine to drop suddenly, and injure you or your chuck tender.

After the round is in and the lifters are finished, it is time to tear down. First disconnect the water hose, and tie it up in a neat coil. Then disconnect the line oiler and short hose. It's a good idea to place a plug of clean waste in the oiler and end of the hose to keep out dirt. Do the same with all openings on the machine. Then crank the machine to the center of the shell for balance, and remove it from the arm with the aid of your helper. Set all equipment far enough from the face to protect it from flying rock. All hoses should be neatly coiled and hung up. Above all, don't throw the machine around, or drop heavy objects on it. A top-notch driller will never abuse the machine that drills his round, and nothing burns him up worse than to have to use a machine ruined by "that sheepherder on the other shift."

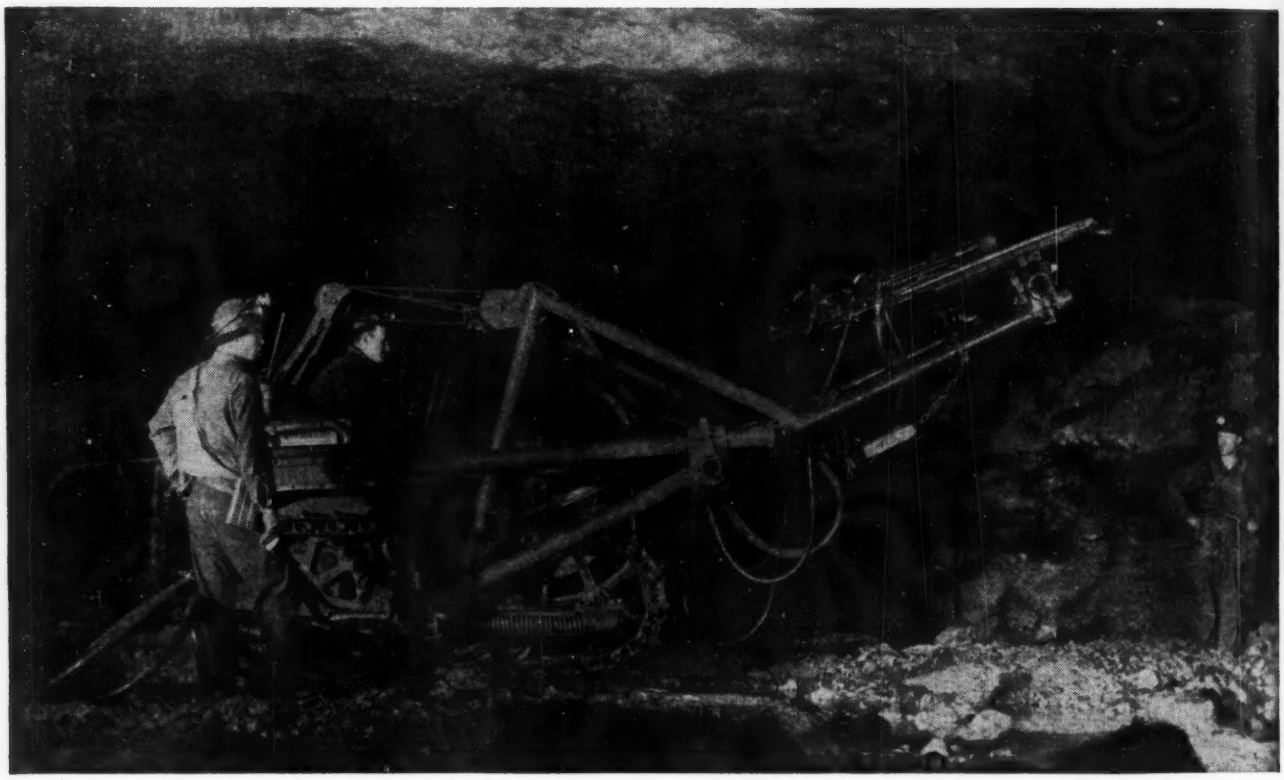
Learn the Right Way

To sum all this advice up quickly, good drilling is a matter of knowing the right way and the wrong way of doing things. The experienced drillers usually say, "Just wait till you have had a few stuck steels, or a set-up falls down on you—you'll soon learn." However, when you know what causes the stuck steels, fallen set-ups, and all the evils that foul up a good shift, you not only can avoid such troubles but should be able to sink one 7-ft. steel after another (bonus rods) and collect higher pay checks as a result.

As a final safety hint, keep the face neat. Hoses, steels, bars, and shovels thrown around carelessly make work twice as hard, and can both trip and trap the driller and helper who may have to get out in a hurry if bad ground breaks loose.

For many of the helpful hints here presented, some of which are controversial, *E.&M.J.* expresses its appreciation to the following: Guy Castle, mine foreman, Keystone Copper Corp., Copperopolis, Calif.; Harold Kramer, engineer, and Joe Funk, miner, Hudson Bay Mining & Smelting Co., Flin Flon, Manitoba, Canada; D. F. Creedon, engineer, Rock Drill Department, Ingersoll-Rand Co., New York; E. J. Downing, chief engineer, Gardner-Denver Co.; John A. O'Neill, assistant research engineer, Anaconda Copper Mining Co., Butte, Mont.; W. T. Schedel, field engineer, Sullivan Machinery Co., Denver, Colo.; E. E. Vaughan, Wallace, Idaho; and the Socony Vacuum Oil Co. for use of the cutaway rock drill illustration.

Tractor-Mounted Jumbo Eases Manpower Situation



ROCK DRILLS with motor feeds and centralizers clamped to crossbar of all-welded, tubular-steel, jumbo frame which replaces bulldozer blade formerly mounted on lower outside channels of tractor.

G. CLEVELAND TAYLOR, *Mining Engineer, Miami, Okla.*

A NEW caterpillar-mounted jumbo, designed by engineers of Eagle-Picher Mining & Smelting Co., Miami, Okla., has emerged from the experimental stage after several months of trial and has been adopted by larger mining companies and local operators of the Tri-State district. Installations of the units have aided in combating manpower shortages.

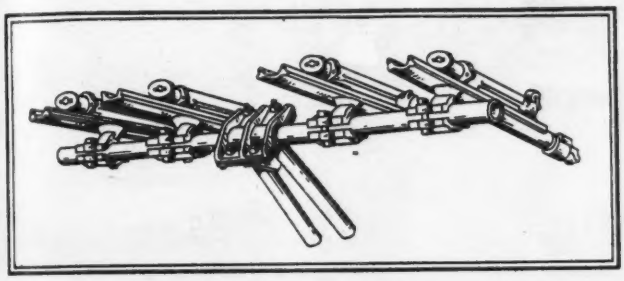
The number of drill operators has been reduced by 50 percent at Eagle-Picher properties using the equipment. Drill maintenance costs have been cut substantially, and much physical exertion required in drilling operations has been eliminated. Powder costs have been decreased because the equipment is flexible and permits drilling holes to best advantage.

A Caterpillar Model 30 bulldozer is converted into a jumbo by removing the blade and substituting a welded frame of steel tubing as shown in the accompanying illustrations. Both legs of a modified A-frame are hinged on pins mounted on the outer frame of the tractor approximately midway between the axles. The crosspiece of the A-frame serves as a structural member and as an air-manifold which feeds rock drills and the tractor engine, which has been converted to operate with compressed air instead of gasoline.

Four heavy rock drills can be mounted on the crossarm, which is clamped to the top of the frame. Drillers stand on a platform attached to the frame below the crossarm. A powered winch mounted on the rear of the tractor raises or lowers the frame to any desired drilling position.

Because of exhaust fumes, the gasoline engine of the tractor could not be used underground. In early models, a 25-hp. electric motor was installed and performed satisfactorily. Better results were achieved, however, by converting the original engine into one which could be driven by compressed air. The conversion, which involved the casting of a new head, was made by local mechanics.

Stability of the jumbo due to its great weight and rigid construction eliminates the necessity of blocking the frame against the sides and roof. Experience thus far indicates that it is easier to collar a hole and maintain machine alignment with the jumbo



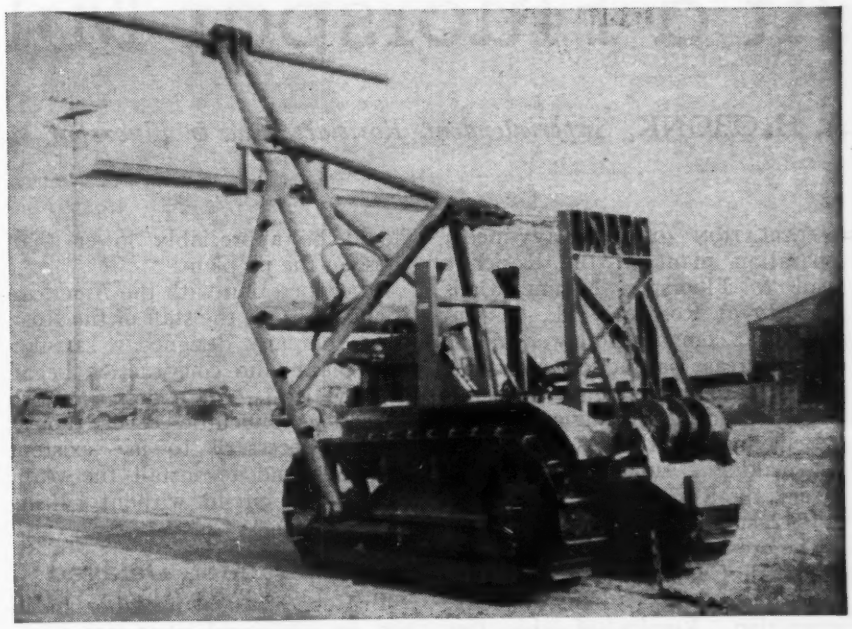
Jumbo is stable enough to permit operation of four heavy drifters mounted on crossbar of frame

MOBILE JUMBO climbs muck piles and maneuvers machines into drilling position for back holes of round 30 ft. above floor of stope.

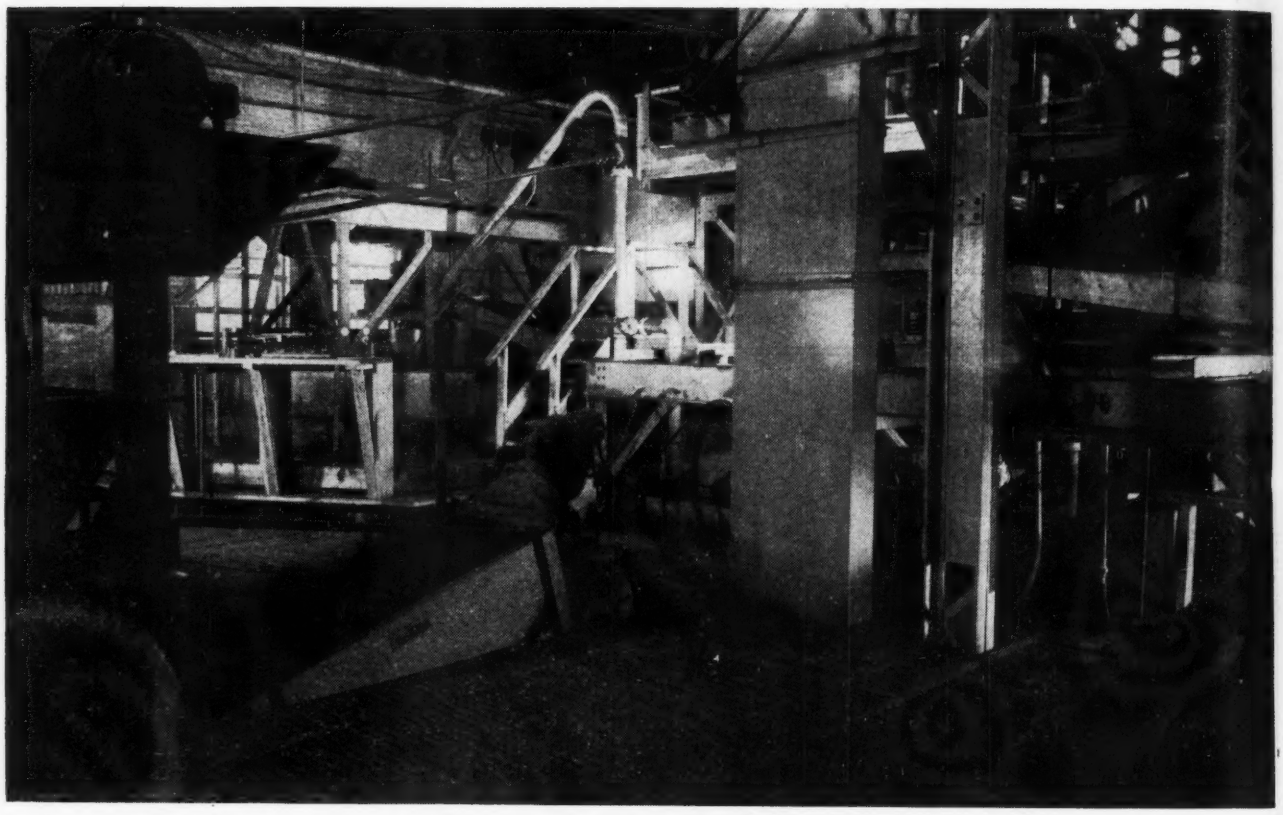
than with drills mounted on long stationary bars.

It was first thought that jumbos could be used only in "sheet ground" deposits consisting of flat beds 8 to 10 ft. thick and of considerable lateral extent; however, they are now being used successfully in drilling thicker deposits. The mobile unit actually climbs up a muck pile and sets machines into position to drill top holes of faces which are 30 ft. thick. These sturdy drill mountings appear to be suitable for many open-pit operations as well.

Grateful appreciation is expressed to S. S. Clarke, general superintendent, Tri-State mines, Eagle-Picher Mining & Smelting Co., who supplied information on the jumbo and developed many of the mechanical ideas incorporated in its design.



WINCH on rear of tractor raises frame to drilling position. Heavy cross member of frame serves as air manifold feeding rock drills and engine of tractor converted to operate on compressed air.



CONCENTRATION END of this Rosiclare, Ill., mill, with 14-ft. cone (left background), for fluorspar-gangue separation. Use of cone process increased recovery, lowered costs, raised capacity.

Heavy-Media Cuts Costs At a Fluorspar Mill

A. H. CRONK, *Superintendent, Rosiclare Lead & Fluorspar Mining Co., Rosiclare, Ill.*

INSTALLATION of a heavy-media separation plant at the Rosiclare Lead & Fluorspar Mining Co.'s property at Rosiclare, Ill., has enabled that company to lower milling costs, increase production, and show a definite improvement in metallurgy over former jigging operations.

Believing that the jigs in use were not making a sufficiently high recovery, the Rosiclare company, early in 1942, submitted samples of its ores to the ore-dressing laboratory of the American Cyanamid Co. to determine amenability to heavy-media separation. Results of this test work indicated that the ores could be concentrated satisfactorily by this process, and that tailing losses would be appreciably lower than those of the jig plant.

In cooperation with the American Cyanamid Co., the staff of the Rosiclare company designed a satisfactory plant, and construction began in July, 1943. Plant design offered no serious difficulties, even though it was necessary to use existent buildings and to install the plant in the mill circuit without halting production.

Construction Delayed

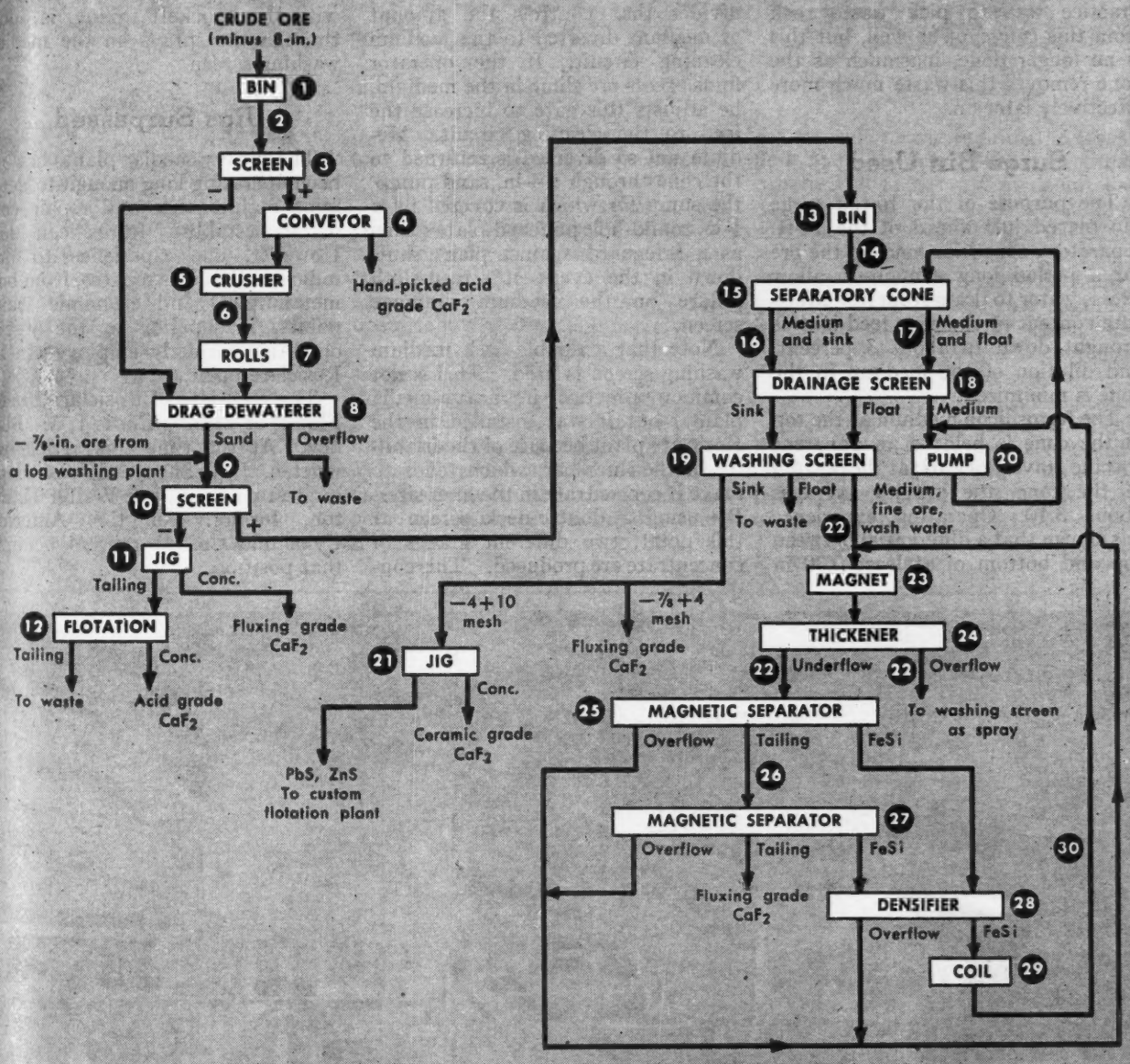
Because of an acute labor shortage, no additional labor was available for plant construction. This, along with the necessity of doing considerable "dead work" and with delays in equipment and materials deliveries, made for a slow rate of erection, and the plant was not completed until February, 1944.

At present, the heavy-media plant is treating ores from the company's Rosiclare, Hawkins, North Boundary, and Deep Shaft mines. Also, a considerable tonnage of jig-plant tailings is available for treatment.

The ore is fluorite in a gangue of limestone, calcite, and quartz, with minor amounts of sphalerite, galena, pyrite, and chalcopyrite. Crude ore is hoisted either directly from underground or from a surface ore pocket to a 75-ton storage bin. Subsequent treatment is shown in the accompanying flow heet. Most of the

HEAVY - MEDIA PLANT

ROSICLARE LEAD AND FLUORSPAR MINING CO.



LEGEND

1. Storage bin, 75-ton
2. Reciprocating plate feeder
3. Zimmer shaking screen, punched plate, ⅞-in. round holes
4. Pan conveyor, 36-in., moving at 28 ft. per min.
5. Telsmith gyratory, No. 5C, 1½-in. discharge
6. Belt conveyor, 24-in.
7. Sturtevant rolls, 16x36-in., ⅞-in. discharge
8. Chain drag dewaterer
9. Belt bucket elevator, 14-in. buckets
10. Double-deck Allis-Chalmers low-head screen, 4x10-ft., 10-mesh separation. Minus 10-mesh fraction is about 23 percent of screen feed.
11. Harz-type jig, 4-cell
12. Flotation plant, 40-ton
13. Surge bin, 16-ton
14. Belt conveyor, 16-in., inclined at 18 deg.
15. Heavy-Media separatory cone, 14-ft. diameter
16. Through 8-in. air lift in central shaft of cone. Requires 65 cfm of air at 35 psi.
17. Float overflows at 18-in. lip
18. Single-deck Allis-Chalmers low-head screen, 4x8-ft., Ton-Cap No. 5205 stainless, protected with Ty-Rod No. 9481. Central partition divides sink from float.
19. Double-deck A-C low head screen, 4x10-ft., Ty-Rod No. 9761 (4 mesh) on upper, Ton-Cap No. 5205 on lower.
20. Wemco sand pump, 4-in.
21. Harz-type jig, 4-cell
22. Wemco sand pumps, 4-in.
23. Alnico block magnets to flocculate FeSi.
24. Dorr thickener, 6x16-ft.
25. Crockett magnetic separator, 24-in.
26. CAC sand pump, 2-in.
27. Crockett magnetic separator, 12-in.
28. Wemco densifier, 30-in.
29. Demagnetizing coil, a.c. current, to disperse FeSi.
30. Screw conveyor, 6-in.

process is evident from the flowsheet, but a few explanatory notes should be made.

Acid-grade fluorspar is hand-picked from the 36-in. pan conveyor carrying the plus $\frac{7}{8}$-in. crude ore. Former practice was to pick waste rock from this conveyor as well, but this is no longer done, inasmuch as the cone removes this waste much more effectively later on.

Surge Bin Used

The purpose of the 16-ton surge bin placed just ahead of the 14-ft. separatory cone is to hold up the ore for a period long enough to allow excess water to drain from it. Moisture content of the cone feed is thus brought down to about 3 percent, and dilution of the medium in the cone is minimized.

The ferrosilicon medium at the top of the cone is held to an apparent specific gravity of 2.62; at the bottom of the cone, the gravity averages about 3.10. Operating experience has shown that a differential between top and bottom of at least 0.30 in specific gravity is necessary to secure the best separation on the Rosiclare ores.

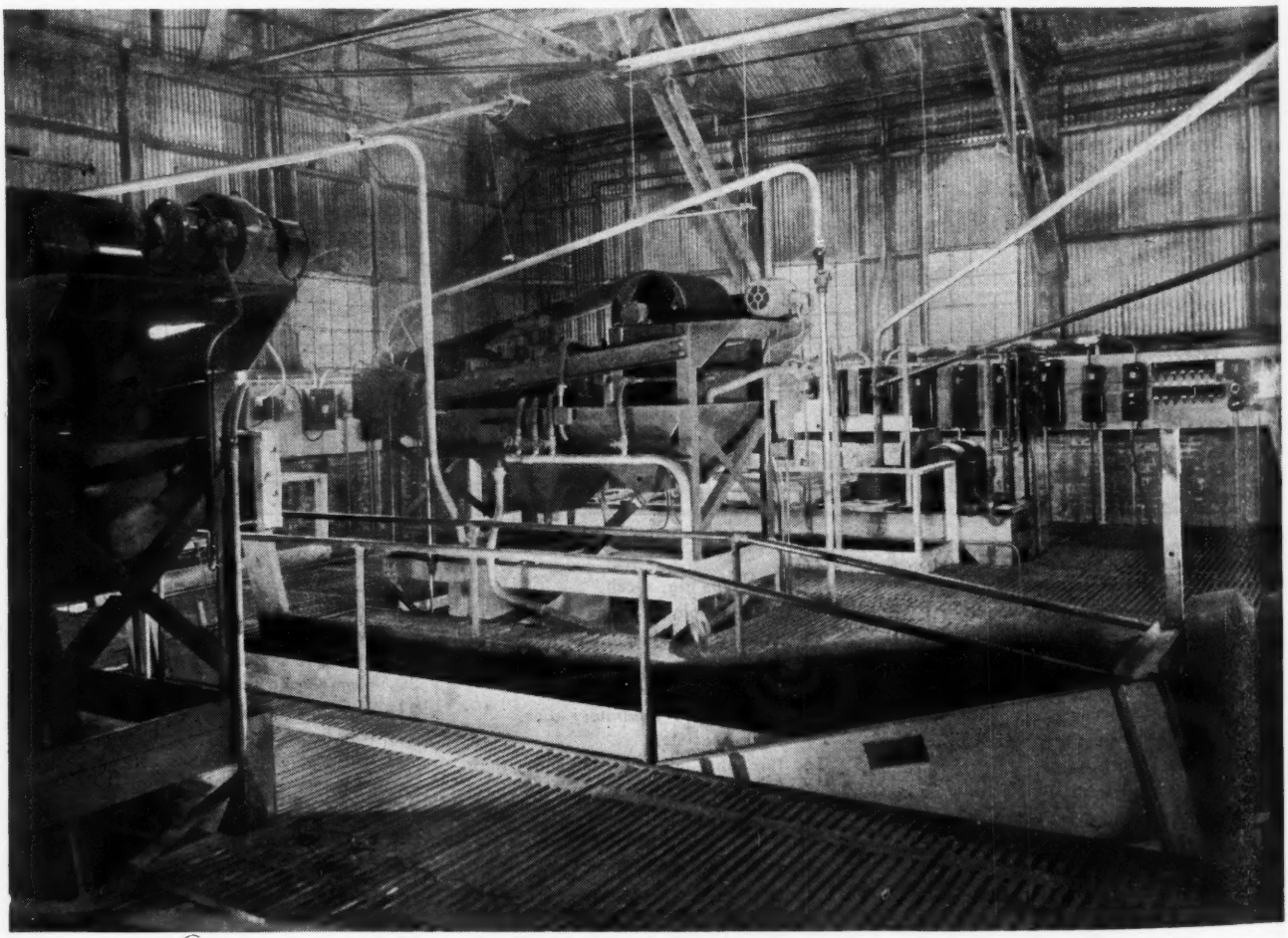
Under the medium drainage screen, which receives both "sink" and "float" products, there is a movable divider that controls the amount of medium diverted to the medium cleaning circuit. If the operator finds excess ore slime in the medium, he adjusts this gate to increase the feed to the cleaning circuit. Medium not so diverted is returned to the cone through a 4-in. sand pump, the sump for which is covered by a $\frac{1}{4}$-in. round-hole punched-plate screen as a safeguard against plant shutdown in the event of screen-cloth failure on the medium drainage screen.

Note that a double-deck medium washing screen is used. This is not common practice in heavy-media plants, but it was installed in the Rosiclare plant because of the friability of the fluorspar, which tends to make it concentrate in the finer sizes. By using a double-deck screen at this point, two different grades of concentrate are produced. This concentration of fluorspar in fine sizes also accounts for the fact that the secondary Crockett tailing, in the medium cleaning circuit, can be sold as metallurgical fluorspar. Make-up water, equivalent to the amount lost with the Crockett tailing, is added through the sprays on the medium washing screen.

Jigs Surpassed

The heavy-media plant has not been operating long enough to determine maintenance and repair costs or to establish ferrosilicon loss. However, our experience to date indicates that this process, from both metallurgical and economic standpoints, is superior to the jigging operation formerly employed in the Rosiclare plant.

The president of Rosiclare Lead & Fluorspar Mining Co. is J. M. Blayney. At the time this article was written, J. J. Sheppard was metallurgical engineer, but Walter Hamilton, formerly of the American Cyanamid Co., at present occupies that position.



FERROSILICON MEDIUM is cleaned in this equipment. The magnetized FeSi is separated from fine ore in the primary Crockett magnetic separator (center) and the secondary Crockett (left), and is collected in the Wemco densifier (foreground) to be returned to the cone through demagnetizing coils.

Concentrate Loading Helped by Novel Conveyor System

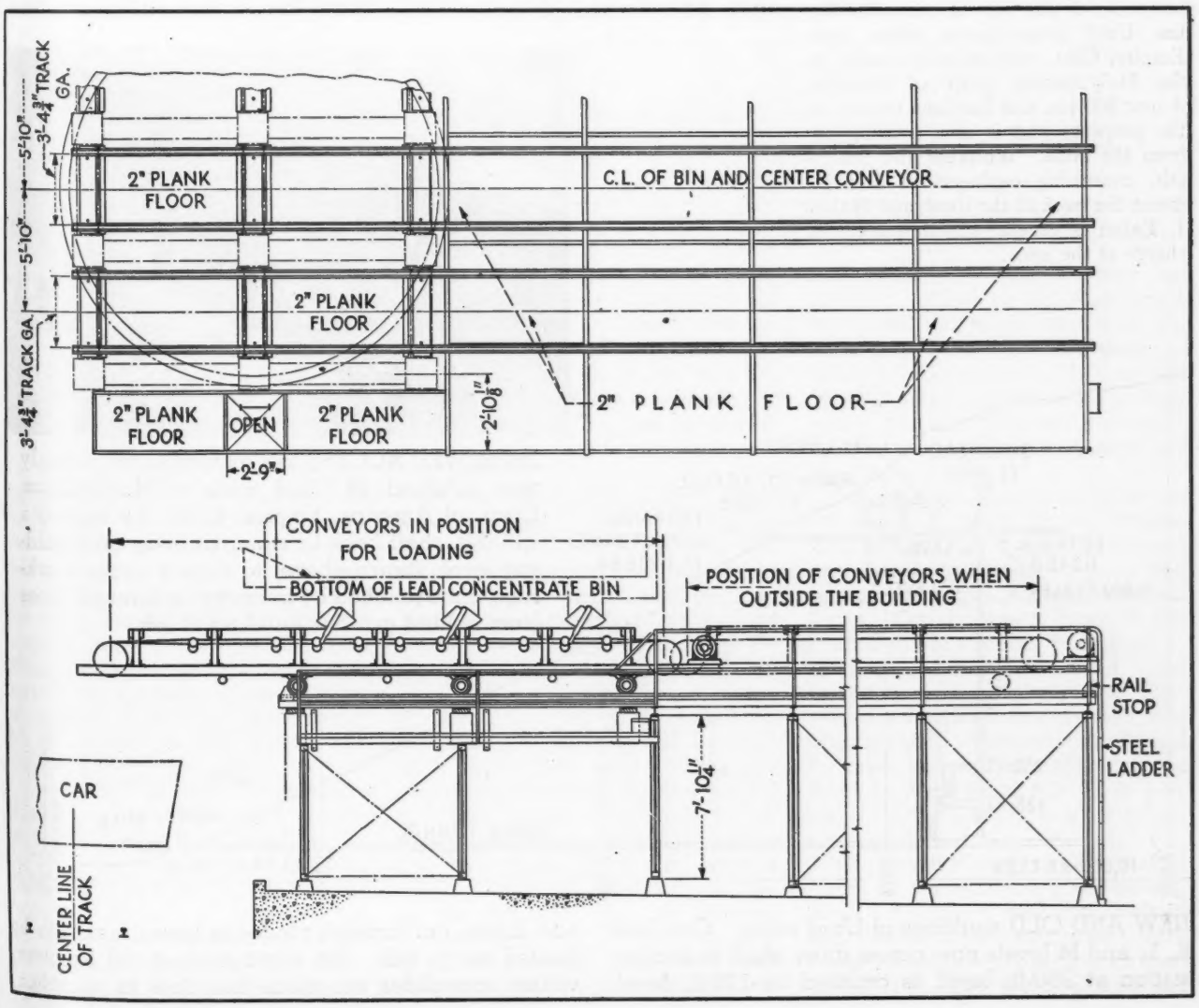
By the use of a novel system of three shuttle conveyors in loading lead concentrates at Bunker Hill & Sullivan's remodeled mill at Kellogg, Idaho, for shipment to the nearby smelter, the loading operation has been made more flexible, as well as considerably faster. An additional important advantage is that the concentrates are protected from freezing practically up to the moment when they drop into the railroad car.

The concentrates are stored prior to shipment in a large concrete bin inside the mill building. Nine openings in the bottom of the bin are equipped each with a hand-operated swing gate, by which the operator can control the loading rate and the movement of the material in the bin.

The three conveyors move on respective parallel tracks of 40-lb. rail supported on a steel frame structure under the bin openings and extending outside the building. The operating platform is floored with 2-in. plank and is reached by short steel ladders.

When loading is not in progress, the conveyors are kept on the track extension outside the building. When a car has to be loaded, the conveyors are pushed by hand into the building and under the bin, their discharge ends projecting through the far side of the building and out and over the car. The car thus can be loaded at any one point as desired or at two or three points simultaneously. This flexibility in loading is advantageous in other respects also, as the material being loaded may be dry and easy-running at times and wet and sticky at others. Moreover, the bin contents are always under full control.

The openings in the near and far side of the building through which the conveyors are pushed are closed when the conveyors are withdrawn from the building. Thus the cost of fuel for heating the building in winter has been held to a minimum.



Fast, Safe Shaft Job Helps Reopen Urad Mine

ROBERT H. RAMSEY, *Associate Editor*

SHAFT SINKING, for the metal miner, has become practically a matter of selection of some routine method found, as a result of long experience, to be best suited to the conditions encountered. We present, herewith, the story of a shaft job that was exactly opposed to the foregoing statement in every way. This vertical three-compartment shaft was raised, not sunk, and none of the methods used in driving it, except use of drills and powder, of course, was even faintly routine or stereotyped. Quite the contrary, in fact.

The shaft in question was only a part, however, of the job of rehabilitating the Urad molybdenum mine, near Empire, Colo., undertaken recently by the Molybdenum Corp. of America. A new 200-ton mill has been erected at the property and is now treating ore from the mine. Whitaker and Schlereth, consulting engineers of Denver, direct the work at the Urad, and Walter J. Eaton is general superintendent in charge at the mine.

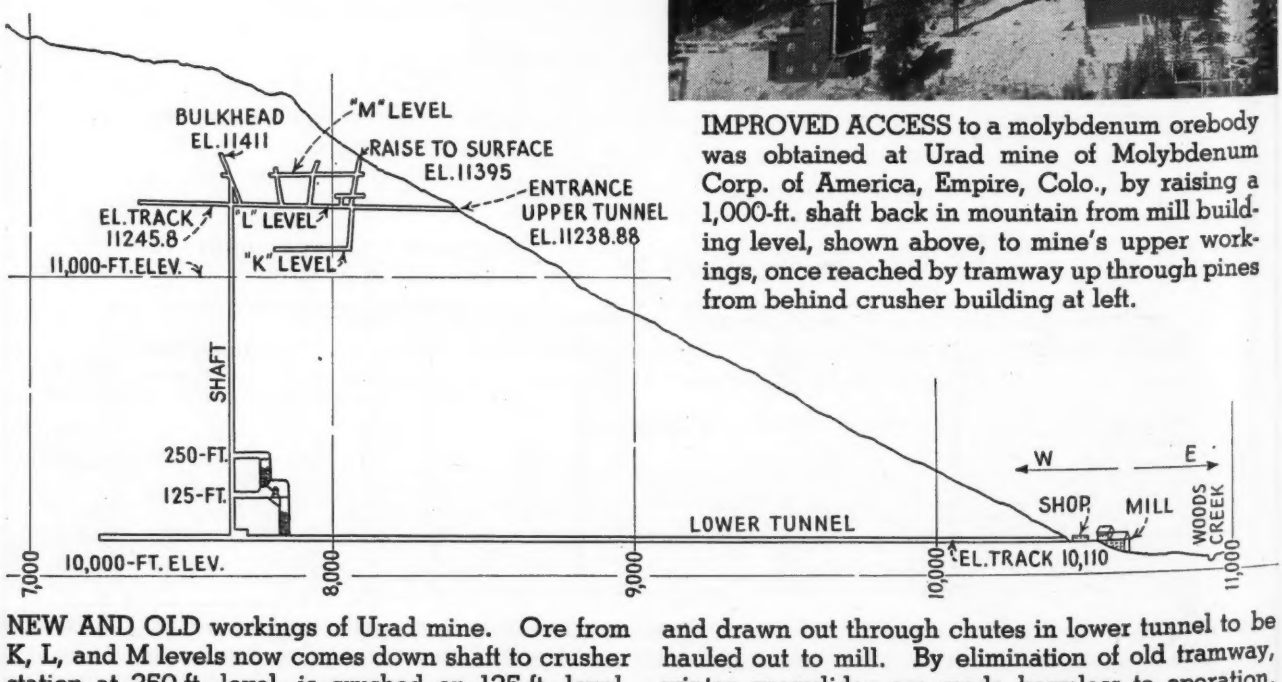
The Mine

Attention was first paid the Urad mine during the first World War, when most of the present mine workings were driven. The accompanying cross-section of the mine shows both old and new developments. The first operators mined ore on levels L and M, brought it out through the upper tunnel, and sent it down to the mill by aerial tramway. This arrangement would have been unsatisfactory for the later program because the mine crew would have either to live near the upper tunnel above timberline or to climb over 1,000 ft. of steep hillside to get to work. The lower tunnel was driven probably with the idea of developing and improving access to the orebodies at greater depth, but before it accomplished its purpose, the mine had to be closed down, and it remained idle until the Molybdenum Corp. took it over.

The Shaft

By far the most important feature of the rehabilitation of the Urad mine has been the 1,115-ft. shaft driven upwards from the lower tunnel to the upper tunnel level, as shown in the accompany-

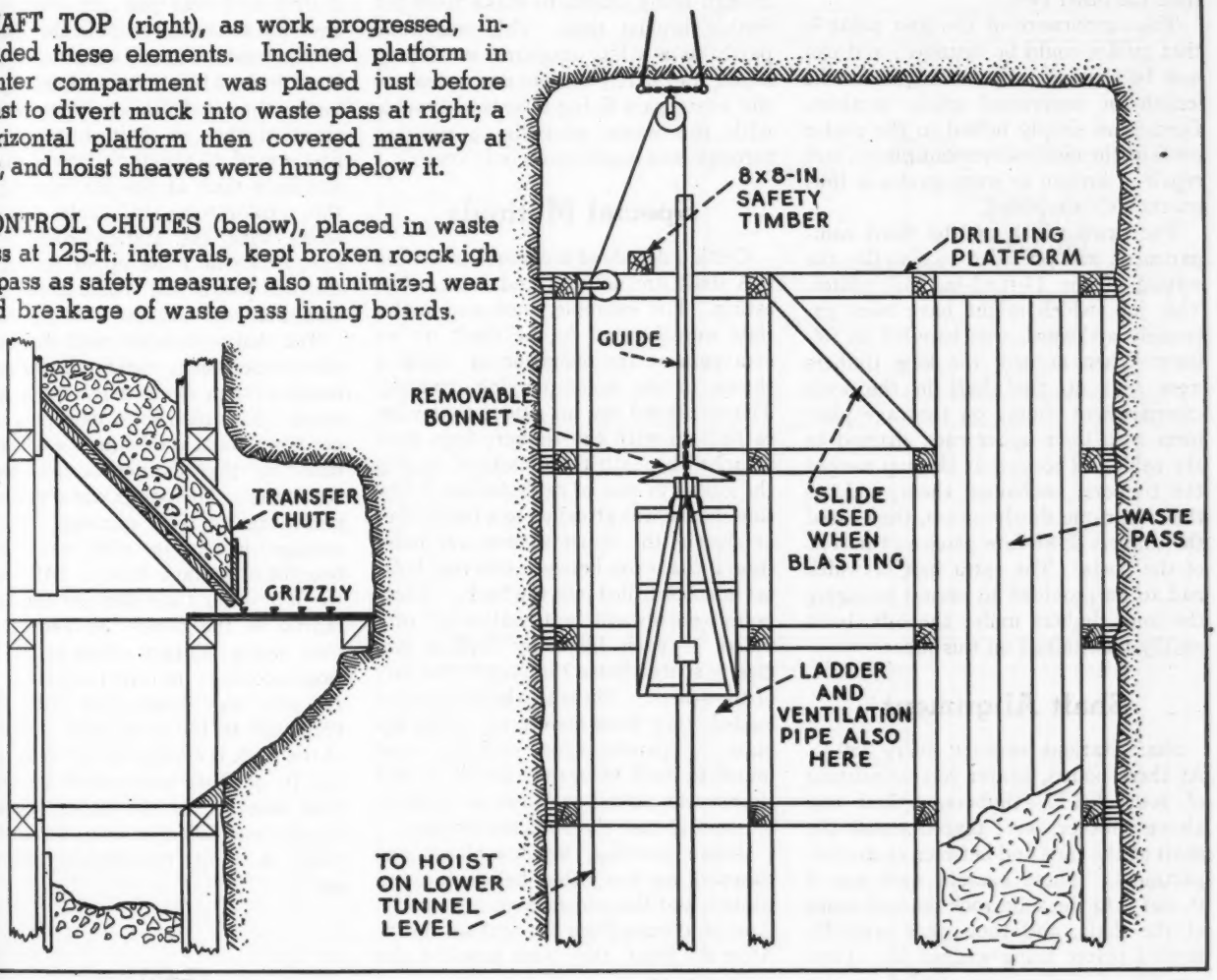
IMPROVED ACCESS to a molybdenum orebody was obtained at Urad mine of Molybdenum Corp. of America, Empire, Colo., by raising a 1,000-ft. shaft back in mountain from mill building level, shown above, to mine's upper workings, once reached by tramway up through pines from behind crusher building at left.



NEW AND OLD workings of Urad mine. Ore from K, L, and M levels now comes down shaft to crusher station at 250-ft. level, is crushed on 125-ft. level, and drawn out through chutes in lower tunnel to be hauled out to mill. By elimination of old tramway, winter snowslides are made harmless to operation.

SHAFT TOP (right), as work progressed, included these elements. Inclined platform in center compartment was placed just before blast to divert muck into waste pass at right; a horizontal platform then covered manway at left, and hoist sheaves were hung below it.

CONTROL CHUTES (below), placed in waste pass at 125-ft. intervals, kept broken rock igh in pass as safety measure; also minimized wear and breakage of waste pass lining boards.



ing drawing. This shaft has made all subsequent development possible, for it rendered the mine accessible to a degree impossible under the old system.

As indicated in the cross-section, the shaft was started at a point 2,840 ft. in from the portal of the lower tunnel, which had first to be reconditioned. The shaft is vertical, 6½x18 ft. in size, and contains three compartments; two for lowering ore and one for the man-hoist and the ladderway. Cutting of the station at the lower tunnel level began in September, 1942, and the shaft was holed through at the upper tunnel level on June 3, 1943. A plumbline dropped from the top shaft set at that time showed a deflection from the vertical of 4½ in. in the long dimension of the shaft, over its total length, and ½ in. in its short dimension.

The method, in brief, was simply to drill and shoot one 6-ft. round, keeping the back flat at all times; muck out the rock, then put in one set of 8x8-in. timber, 5 ft. 6 in. high. In this way, the timbering was kept up to within one set of the back throughout the job. The length of each round was varied to suit the height of the timber in the shaft, for it was desired never to let the back get more than 6 ft. above the last set. The work would have become too dangerous if the back were allowed to gain on the timbering. At first the shaft was not lined, but experience soon showed the value of it, and for most of its length the shaft is now lined with 2-in. planks.

Drilling was done with three Ingersoll-Rand R-58 stopers, using Jackbits. In preparation for blasting, drills and accessory equipment were removed to the ladderway under the bulkhead which formed the drilling platform, and a horizontal platform was laid over the first, or hoisting, compartment. Then a platform was laid over the center compartment, but inclined down one set. The third compartment was left open as a waste pass, except for control chutes, described later, put in every 125 ft. This platform arrangement diverted most of the muck directly into the waste pass, and the only mucking required after the blast was to clear off the platform over the hoisting compartment.

Electric blasting caps were used, and all rounds were fired from the foot of the shaft after everyone was out of it. Following each blast, muck was pulled out of the bottom of the waste pass, but never more than was required to make room for the rock from the next blast. Waste rock was kept high in the chute as a safety measure, because during drilling, men might fall into the waste pass.

The timber was then brought up one set, aligned by plumbing, and wedged. The shaft and the ore pass linings were then placed, bulkheads put in to drill from, and work on the new round was begun. Certain unusual details in this method will be discussed further on.

Speed was essential in all these operations, and no attempt was made to hold to a rigid schedule of accomplishment per shift. Each crew coordinated its tasks and worked efficiently, and when its eight hours were in, it gave place at the working face to a new crew.

The system of timbering the shaft is shown in an accompanying drawing. Note two things in particular about it: one, that there are center posts in each compartment to act as backing for shaft guides; two that the man-hoist and

ladderway compartment is 1 ft. larger than the other two.

The significance of the first point is that guides could be installed, and can now be repaired, without regard to the length of individual guide sections. Guides are simply bolted to the center posts at the most convenient places, and repair of broken or worn guides is thus enormously simplified.

The extra width on the third compartment was provided to simplify the setting of the 17-ft.x2-in. wall plates. This job, which might have been extremely awkward, was handled as follows: When needed, the long timbers were sent up the shaft in the wide compartment, riding on the cage platform with their upper ends chained to the cable. The men at the top caught the timbers, unchained them, and, as the cage came slowly on up, they eased the timbers down into place on the tops of the posts. The extra foot of width had to be provided to permit swinging the long timbers under the 6-ft. back rigidly maintained on this job.

Shaft Alignment

Shaft stations were cut every 250 ft. At these points, bearer sets, consisting of four 8x8-in. timbers, bolted one above another, were placed across the shaft at the ends and between each compartment. These bearers were run 2 ft. out into the solid rock on both sides of the shaft, and they were carefully leveled before being wedged in. Then one set of timber was erected on the bearers and slid about until a plumb line to the bottom of the shaft showed that the new set was aligned. Each subsequent set of timber was then plumbed to this first set, until the next station was reached and new bearers were put in. This scheme made the shaft aligning job much easier and faster.

These bearer sets were put right at station level, but it is now evident that it would have been better to place them one set below the station. This would have eliminated the necessity of cutting through four timbers (instead of one) to install landing chairs for cages, later when opening the intermediate levels.

The control chutes, which were built into the waste pass at 125-ft. intervals, are shown on p. 71. The grizzly was set in each one, as shown, in order to permit breaking large rocks that might otherwise hang up in chutes below. Note that the lining was reinforced with steel wearing plates at the points where rock was likely to strike it. This steel was collected in the form of old worn-out snow-plow blades by diligent search all up and down the length of Highway 40 in the mountain areas.

Each 125-ft. length of the waste pass was kept nearly full of muck, only enough being drawn to make room for freshly broken rock. This was done partly as a safety measure, as already noted, and partly to hold down wear on the waste pass lining boards. Trouble with the waste pass lining wearing through was experienced only once.

Special Methods

Certain details of technique in raising this shaft are unusual and most interesting. For example, men and materials were hoisted in the shaft by an arrangement the operation of which is shown in the accompanying drawing. The crosshead ran on guides that were carried up with the timber; dogs were attached beneath the crosshead to grip the guides in case of cable failure. The side sheave was attached to a top timber as shown; the upper sheave was hung from a chain run between two ring bolts set in holes drilled into the back. These holes were always "automatically" provided in each blast by drilling two closely spaced holes 2 ft. longer than any of the others. These two holes were not loaded; they were merely cut off by the blast. Expansion-type eyebolts were found to hold securely, though an 8x8 timber was placed as shown as a safety measure in case the bolts should slip.

Before blasting, a come-along was clamped on the cable below the top timber, and the two sheaves were taken down and hung from the next set down. After the blast, they were replaced one set higher up.

Water for the drills was brought up the shaft in a 100-gal. tank hung below the crosshead. The tank was filled from a reservoir obtained by concreting off a small water flow behind the hoist. While drilling was in progress, the tank was suspended at the top of the shaft, and hoses were attached to it as in regular drifting with a water tank.

To prevent splintering of the top timbers during blasting, an ingenious arrangement of bumpers was used. This consisted merely of 8x8 timbers laid over each member of the top shaft set and held in place by ordinary stay chains wrapped around both timbers and hooked in place. The scheme was speedy and effective.

Air for ventilation was brought up the shaft in a line of 16-in. Naylor spiral-welded steel pipe installed in 20-ft. lengths clamped together. Incidentally, this line supplied an exact measurement of the height of the shaft, and taping was never necessary. When the count of the 20-ft. lengths reached the proper figure, raising was halted and a crosscut driven that struck the upper tunnel exactly on its level. Vertical alignment was held by the method already noted.

Before the final crosscut was driven, a drill hole was put out horizontally from the top of the shaft in the direction of the upper tunnel, which was calculated to be 11 ft. away. Lacking steel longer than 9 ft., this hole was stopped short of the old drift, but when the first round of the top station cut was put in, a stick of powder was put into this exploratory drill hole and fired along with the station round. This shot broke into the upper tunnel, and the drill hole is still visible in the tunnel wall, halfway between floor and roof.

The shaft was raised with three crews of nine men each, working under a wage bonus system devised by the management. This plan set a base pay of 70¢ per hour, but gave bonuses each month based on the advance of the shaft in that time. The bonus was a graduated percentage of total earnings, that percentage increasing with each higher bracket of footage driven. All men on the job, other than salaried employees, shared in the bonus, an arrangement that had a salutary effect on all functions accessory to direct raising. That the plan was satisfactory both to the crew and to the demanded completion of the work is evidenced by the fact that 212 ft. of shaft were raised during the final month. In the entire operation, no one was killed or even seriously injured—a most remarkable record of safety.

Geology

The Urad mine is situated in Clear Creek County, Colo., not far from Idaho Springs. Its workings open on the southern slopes of Red Mountain, a prominent peak overlooking the Berthoud Pass road about 70 miles west of Denver. The mine is 1½ miles from this highway.

To quote from a geological report on the property made recently by J. A. Vanderwilt, "Molybdenite mineralization in the Urad mine is along a fissured zone or vein system in altered Silver Plume granite of Pre-Cambrian age, close to a small plug or stock of rhyolite porphyry of Tertiary age.

"The vein system strikes nearly E.-W. and dips 45 to 55 deg. to the north. The porphyry contact also strikes nearly E.-W., but it dips nearly 80 deg. to the south. Thus the veins, projected downward, intersect or join the contact.

"The mine workings are too limited to show the relationship of the vein system to the porphyry contact, or that of the mineralization to the vein system. Some generalizations are possible."

Mr. Vanderwilt then goes on to point out that molybdenite occurs in a main

fracture vein system, in which veins several feet wide have been found, and that the mineral also occurs in rich concentrations up to several inches thick in subsidiary joints and fissures in both hanging wall and footwall. Most of the present workings are in the hanging wall to the north, but current exploration is disclosing considerable ore in the footwall.

The molybdenite is associated in the larger veins with quartz; also in veinlets without associated minerals, and in small scattered crystals in the altered rock. Rhodochrosite, fluorite, pyrite, and molybdite have been found in varying quantities. According to Mr. Vanderwilt, the sequence of mineralization was roughly: (1) deposition of molybdenite and quartz in the larger fractures, with migration of molybdenite out into the smaller fractures; (2) reopening of fractures and deposition of minor minerals. Some pyrite accompanied both periods of mineralization.

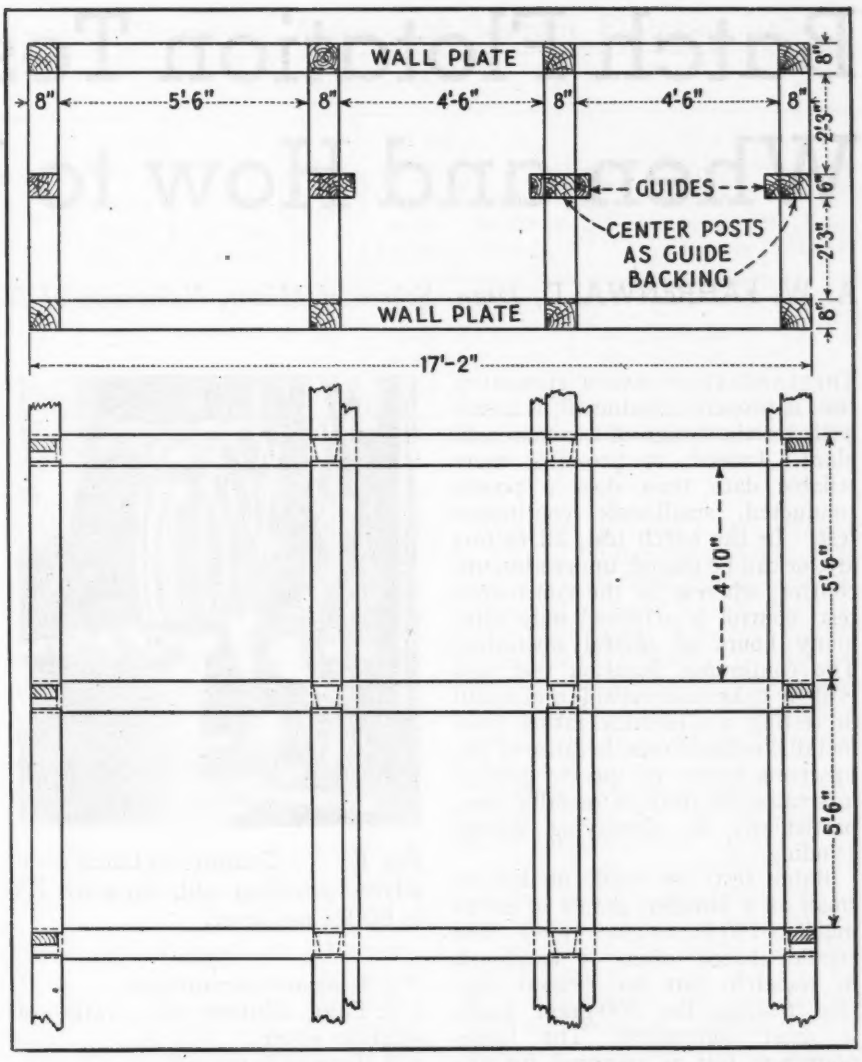
Mining Methods

The shaft was equipped for lowering ore by carrying a raise 85 ft. above the shaft, then cutting a hoist room in a convenient spot on the upper tunnel level, then driving an inclined raise from it (for the cables) to connect with the raise over the shaft. An Allis-Chalmers 100-hp. double-drum hoist equipped with Lilly controller is used.

Ore is trammed from the stopes to the shaft in 20-cu. ft. cars, which are lowered to the crusher pocket on the cages. No skips are used. At the 250-ft. level, cars are taken off, trammed to the nearby crusher pocket, and dumped onto a grizzly, 8x8-ft. in size, with 8-in. square openings. From the pocket, ore passes over a 36-in. pan feeder, over a 2½-in. grizzly and into the No. 10 Allis-Chalmers McCully gyratory, set for a 3-in. discharge. Crushed ore is drawn from a chute below the crusher into 57½-ft. Granby-type cars. Ten cars, with 3-ton loads each, make up a train, which is hauled to the portal by a Jeffrey trolley locomotive.

The crusher station and the ore pockets were cut by raising from the lower tunnel level, and the crusher was brought up the ore pass in sections. All surveying for the crusher installation was done by W. H. Ranch, mine superintendent, with a Brunton compass.

Mill feed is now coming from drifts, many of them in the unexplored footwall side of the main fracture zone, and from ore taken out of the old stopes above the upper tunnel level. New stopes have been prepared on L level, and development is under way on the three levels—K, L, and M. Three Eimco loaders are used in drifting, and the mining method planned is ordinary shrinkage stoping for the present. Stopes vary in width from 10 to 20 ft., but there are no well-defined walls to limit stope size. When more is known about tonnage and structure, some form of caving method may be found more suitable.



SHAFT SET, used in raising Urad shaft, was simple but rugged. Note posts set as backing for guides to simplify setting and maintaining them; also note extra size of manway compartment to facilitate handling large wall plates. Quick method of aligning timber is explained in text.

The Mill

Because the mill flowsheet is being altered from time to time in an attempt to obtain best possible results, no definite flowsheet can be given with this article. The process involves grinding of the ore in a Marcy rod mill, followed by flotation in Denver Sub-A machines. The rougher concentrate is cleaned once, then re-ground in a separate circuit before re-cleaning. Various reagents are now being tested, but it is not yet possible to say which will be used.

Molybdenite, of course, will float with ease; the problem is rather to depress minerals objectionable in the concentrate. At Urad, some of the molybdenite grains are intergrown so finely with silica that not even 400-mesh grinding would separate them. At present a satisfactory concentrate is being obtained. Current experiments are directed toward increased recovery, and the indications are that this problem will soon be solved.

The mill itself is an excellent example of fine mill construction. It is insulated throughout to make winter operation comfortable, and a boiler provides heat and steam for concentrate drying. F. C. Blickensderfer is mill superintendent.

In closing, I want to express my thanks to the management for permission to prepare this article, and to Walter J. Eaton for his hospitality at the mine and his kindness in providing me with the details of the Urad shaft job.

Batch Flotation Test—When and How to Use It

A. W. FAHRENWALD, *Dean, School of Mines, University of Idaho, Moscow, Idaho*

THE LABORATORY BATCH FLOTATION test, if properly conducted, is a safe basis for the design of a commercial plant. Indeed, it provides more reliable data than does a poorly conducted, small-scale continuous test. In the batch test, all factors are, or can be placed, under absolute control; whereas in the continuous test, control is achieved only after many hours of skillful operation. The continuous flotation test also is likely to be more reliable and useful in testing non-metallic rather than metallic mineral ores, because of the upsetting factor of specific gravity in small-scale tests on metallic ores, particularly in classifying during grinding.

Batch tests are made on lots as small as a hundred grams or on as much as 100 lb., or even more. The smaller batch often is employed in research, but for general routine testing, the 500-gram batch is most convenient. The large-poundage test is reserved for the final check-up of a process, or to provide a substantial weight of concentrate or of reclaimed water for subsequent studies.

Some of the more important factors to be considered in batch testing are:

1. The grind
2. The surface content of the ground ore
3. Reagent concentration
4. Pulp dilution—i.e., ratio of solids to water
5. Type of batch cell
6. Manner of adding reagents.

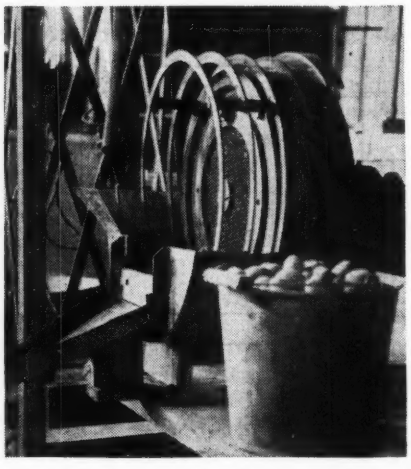


Fig. 1 . . . Continuous batch classifying-grinding unit; capacity, 25 to 50 lb. per hour.

Types of Batch Tests

There are a variety of batch testing techniques. Several of these are:

1. The single-stage batch test, including the one-pass batch grind, which is the standard routine test. The products made are a rougher (uncleaned) concentrate, and a tail.
2. The "continuous" or "locked" test, including the batch grind and a series of batch flotation tests. In this test one provides, say, eight similarly prepared batches of wet ground ore. Each part is subjected to batch flotation; the rougher concentrate of each test is treated in a cleaner cell, and the tailing (middling) from the cleaner cell is added to the succeeding test. The products are a cleaner concentrate and a tail. This test disposes of the middling fraction of the ore and gives metallurgical results intended to parallel practice.
3. The "continuous" or "locked" test involving a series of grinds, flotation of successive grinds, cleaning of the rougher concentrate, and return of each cleaner tail (middling) to the succeeding grind. This test yields two products and is intended to simulate standard practice by regrinding middlings.
4. The test in which classification is involved. The procedure is to classify before grinding to remove finished material (usually 10 mesh) in the feed, grind the sand, reunite the products, and batch float. The object of this technique is to diminish over-grinding and to provide a batch feed more nearly approaching that produced in practice.
5. The test involving classification

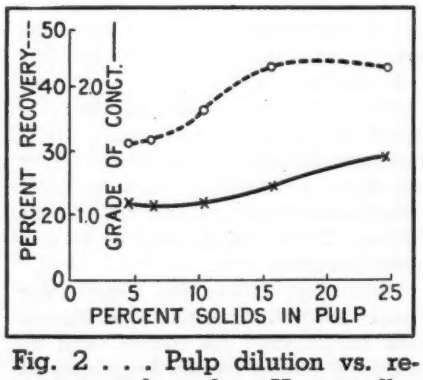


Fig. 2 . . . Pulp dilution vs. recovery and grade; pH controller and depressant constant with respect to ore.

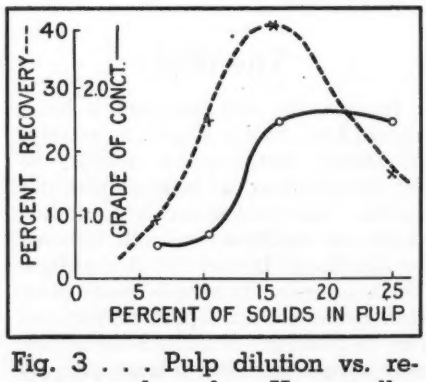


Fig. 3 . . . Pulp dilution vs. recovery and grade; pH controller and depressant constant with respect to water.

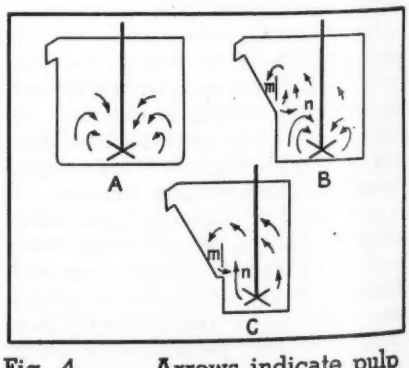


Fig. 4 . . . Arrows indicate pulp flow direction in various designs of laboratory flotation cell. Pulp short-circuits less in cell C.

TABLE I. Effect of Desliming on Recovery, Amount of Reagent, Flotation Rate

Grade of Conct., % CaO	Original Ore			Slime Removed, Percent by Weight								
				1.55%			10.2%			21.2%		
	Conct., Wt. %	Depressant, Lb./Ton	Time of Frothing, Minutes	Conct., Wt. %	Depressant, Lb./Ton	Time of Frothing, Minutes	Conct, Wt. %	Depressant, Lb./Ton	Time of Frothing, Minutes	Conct., Wt. %	Depressant, Lb./Ton	Time of Frothing, Minutes
3.0	50	1.00	12	48	0.78	10	49	0.52	8	..	....	6
2.5	50	1.25	..	52	1.12	..	49	0.72	...	51	0.36	..
2.0	49	1.50	..	49	1.48	..	45	0.90	...	46	0.48	..
1.5	35	2.50	8	39	1.80	6	39	1.10	5.0	38	0.56	3

Magnesite Ore Assaying: CaO, 4.11%; R_2O_3, 2.5%; and Insol., 3.13%. Four samples, given identical grinds, one floated direct, other three deslimed to varying degrees, as shown.

and desliming. In this test, the ball-mill feed is classified, the sand ground for the specified time, the products are reunited, and the whole batch is deslimed. This method has wide usefulness in non-metallic mineral testing where some loss of mineral in the slime may be metallurgically desirable as well as economical.

6. The test involving the standard closed-circuit grind followed by batch flotation. In this technique, the batch flotation feed is prepared in a small closed-circuit grinding unit. The classifier overflow is caught in a tub, or, preferably, run at once into the large flotation cell. This test obviates the difficulty of reagent control encountered in the short-duration, small-scale continuous run. The batch cell for this test should have a pulp-level control and a mechanical froth paddle.

In our laboratories this small-scale continuous grind is made in the machine shown in Fig. 1. This unit automatically classifies as it grinds. The fineness of the grind, as in practice, is controlled by the rate of feed and the volume of water added.

By proper choice of one of the aforementioned techniques, various of the factors outlined may be taken properly into account and metallurgical results should be obtained comparable to those to be expected in practice.

Discussing, now, the factors in batch testing previously listed—

The Grind. Reduction of the sample to floatable particle size should be done in a type of grind designed to give the same surface content as is likely to obtain in actual practice. For this job, techniques (4), (5), and (6) are available.

The Surface Content of the Flotation Feed. For any given weight of mineral to be floated, and assuming that all particles are of floatable size, the amount of surface present determines (1) the capacity of the flotation machine per unit of cell volume (less surface, higher capacity); (2) the amount of reagents required (less surface, less reagents); and (3) the metallurgical results (less surface, higher grade of concentrate and higher recovery). Also, the less surface, the better the performance and economy of operation of all subsequent machines and processes in the general flowsheet.

The data in Table I lend support to these statements. Note that desliming (discarding of depressant-consuming mineral surface) has reduced the amount of reagent needed to less than one-quarter of that required on the original. The time of flotation was reduced from eight minutes on the original to three minutes.

These data are typical of many recorded, showing the significance of the surface factor. It applies to collector as well as depressant. This situation always is encountered in testing slimy or friable ores, and it is particularly prominent when the floatabilities of tailing and concentrate minerals are similar. In this case the minerals primarily were limestone, dolomite, and magnesite, all three normally floatable with oleic acid.

Pulp Dilution and Pulp-Level Control. Pulp dilution in flotation test work probably should be recorded on a volumetric basis rather than by weight. For any given ore, the percent solids, by weight, in the pulp affects: (1) the pulp density, or, with reference to the impeller, the pulp-head against which the impeller must make air; (2) the size of bubble; (3) the viscosity of the pulp; (4) the rate of rise of the bubble in the pulp; (5) the classifying action in the flotation cell; and (6) the reagent (molar) concentration in the water phase. The power required to operate the cell is also a variable with pulp density. Pulp dilution, therefore, is not an insignificant factor.*

In some routine testing of magnesite ore, the factor of pulp dilution was taken into account. The data

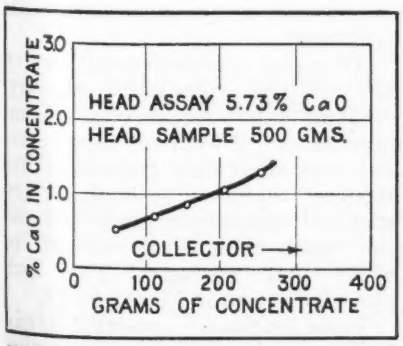


Fig. 5 . . . Weight of concentrate vs. concentrate grade; collector variable, depressant constant.

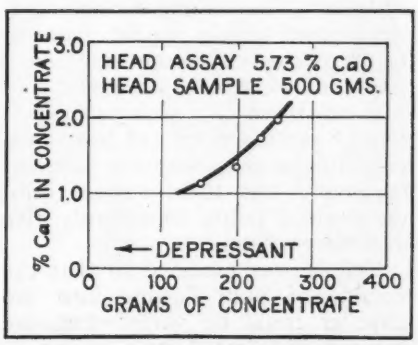


Fig. 6 . . . Weight of concentrate vs. concentrate grade; collector constant, depressant variable.

* Fahrenwald, A. W., and Abele, L. T.: "Effect of Grinding Time and Pulp Dilution on Flotation," *Eng. and Min. Jour.*, Vol. 131, No. 4, Feb. 23, 1931.

Fahrenwald, A. W., Joseph Newton, and Patrick L. McManus: "Pulp Density as a Factor in Flotation of Gold Ores," *Eng. and Min. Jour.*, Vol. 137, No. 11, Nov. 1936.

Table II. Effect of Volume of Circulating Pulp on Recovery, Grade of Concentrate, and Aerating Capacity of the Cell

(Magnesite Ore, CaO, 4.11%)

	Wt. of Conct. Constant Time	*% CaO in Conct.*	*Cu.Ft. Free Air per Min. Taken by Cell*
Small circulation	450	4.96	0.615
Medium circulation	451	2.30	0.700
Large circulation	548	2.47	0.720

Table III. Showing Effect of Pulp Circulation on Rate of Flotation of Limestone (Frothing Time Constant)

	Weight of Concentrate				*Cu.Ft. Free Air per Minute*
	No. 1	*No. 2*	*No. 3*	*No. 4*	
Small circulation	84	131	153	368	0.615
Medium circulation	98	152	195	445	0.720
Large circulation	148	178	210	528	0.90+

Table IV. Effect of the Depth of Pulp (Water) on the Aerating Capacity and Power Required by a Flotation Cell

Depth of Pulp in Inches		*Power Input, Watts*	*Air Consumption, Cu.Ft. per Minute*
Machine Stopped	*Machine Running*		
13	13½	115	0.682
9¾	10½	97	0.737
7	7¾	75	0.845

plotted in Figs. 2 and 3 show the effect of pulp dilution on recovery and grade of concentrate.

In the batch testing of any ore in which the weight of concentrate to be floated is a large percentage of the original, pulp dilution becomes a problem. In floating magnesite ore, for example, as much as 50 to 70 percent of the solids by weight are removed in the froth. The pulp level in the cell can be kept at a suitable skimming level only by adding new water, which may improperly dilute the pulp by the end of the test.

Cell Design

This situation is entirely unlike that which obtains in practice where the pulp flow is continuous, and a batch test that ignores this fact is likely to give misleading results, with grade too high and recovery too low.

On deslimed feed, because the concentrate is of a sandy texture and relatively "dry," complete test normally can be made without adding "make-up" water.

To obviate this factor in batch testing, I have developed a constant pulp-level laboratory cell, in which the pulp level remains constant at the desired level throughout the entire test.

In Fig. 4, a, b, and c, are shown three designs of laboratory cell. To avoid controversy, impellers are not shown. In cell 4a, bubbles beaten into the pulp must rise in a circuitless pulp path. The pulp is severely short-circuited with the impeller. In cell 4b, as a result of the difference in the density of the pulp in compartments *n* and *m*, there is a tendency for the aërated pulp in the impeller compartment *n* to flow upward and forward. The pulp cycle in this cell, however, is feeble and obtains only in the upper zone of the cell.

In cell 4c, there is a more positive flow of pulp from the impeller compartment *n* over a weir into the spitz *m*. The volume of the flow is determined largely by the diameter of the conduit connecting compartment *m* with the impeller. In this cell there is a positive upward flow of aërated pulp, and less short-circuiting of pulp with the impeller. On many ores these various cells, on identical pulps, consistently give dissimilar results.

Cell 4c was modified so that the volume of pulp flowing into the impeller could be varied—i.e., the volume of aërated pulp rising in compartment *n* could be varied. With this machine, using magnesite ore, a series of tests was made in which this factor was the variable. The results are presented in Table II.

Next, in order to simplify the test to flotation of a single mineral, pure limestone was used. Thus, only the rate of flotation is involved. Here again, the pulps in the various tests were identical. The test is recorded in Table III. It is clear from these data that laboratory cell design, as it involves pulp circulation, is a significant factor in ore testing.

Cell Depth Factor

The small-scale laboratory cell is only a fraction (not more than one-fourth) the depth of the standard commercial cell, yet this factor is never taken into account. A standard self-aërating cell was available, in which the depth factor could be studied. Using water, a group of three experiments gave the results shown in Table IV.

Reagent Additions

In the testing of most non-metallic ores, and with particular reference here to magnesite, the amount of collector added determines the quantity and grade of concentrate made. This is so because neither the depressant nor the collector has a sharp, specific action on the minerals to be depressed or the mineral to be floated. Addition of collector and depressant must be carefully balanced to secure optimum results. For example, too much depressant may completely kill the magnesite float, no matter how much collector is used.

The way to get at the proper quantity of these reagents is to make two series of runs. First, with the collector constant but in an amount less than sufficient to collect all the concentrate mineral, run a series with the depressant the variable; second, with the depressant constant, add the collector reagent in small increments. Take off a concentrate for each addition of collector, and weigh and assay each concentrate separately.

Then plot cumulative recovery vs. the assay of cumulative recovery, and cumulative recovery vs. amount of collector. Now, from these curves one may determine graphically the recovery that may be made for any specified concentrate grade and also the exact amount of collector to effect that recovery. Two such plots are shown in Figs. 5 and 6.

These graphs are presented simply to indicate the precautions that must be taken in the batch testing of some ores, if interpretable results are to be had.

How the Small Mine Operator Meets Trouble

A. L. PIERCE, *Mining Engineer, Summitville, Colo.*

How SMALL is a small mine, and why is it called small? Obviously a definition based on tonnage or finances can be made only relative; for to a 10-ton-a-day operator, a 200-ton mine is "large," but to the board of directors of a 50,000-ton porphyry copper job, a 200-ton mine is not only small—it is insignificant. Furthermore, in my own experience there have been mines of a few tons' capacity that paid handsome profits, and there have been 600-ton mines that did most of their bookkeeping in red ink. Let us look elsewhere for our definition.

Maury Maverick, the ebullient head of the Smaller War Plants Corp., was heard recently to remark that a small plant was one that could neither dominate any part of its industry nor afford to maintain a lobbyist in Washington. Most mines are small by that definition, although collectively they do make their voices heard.

Charles F. Jackson once said[1] that a small mine was the opposite of a large one, but he went on to clarify this statement by saying that a large mine requires delegation by the manager of responsibility for the various phases of operation to a number of subordinate officials. The opposite of this means that in a small mine everything would be dumped in the manager's lap, which is exactly what happens. Mr. Jackson's definition, therefore, seems about as good as any.

[1] "Operating the Small Mine," *E.&M.J.*, Vol. 141, No. 8, p.42.

Usually the small operation can afford only one competent engineer in charge, who must combine the functions of manager, mechanical engineer, electrical engineer, metallurgist, geologist, surveyor, lawyer, and physician. Capable repair men are a rarity these days, and the manager may also find himself forced to explain to some willing but inexperienced mechanic how to fix mine or mill machinery or how to handle some welding job. If the small mine manager doesn't already know these things, he'd better learn them soon.

One of the most common headaches of the small operator is caused by inadequate finances. Often the financial tale is the tail that wags the dog; and paradoxically, the shorter the tail, the more the dog wags. Frequently the manager of a lean-budgeted property must meet a payroll by cleaning up or shipping his product more often than is economic; or he must let development get behind or use a higher-cost mining method because he can't afford to let broken ore accumulate in the mine.

"I reckon I dug nigh on to a hundred bushel of ore today."

We are all familiar with the small miner whose good prospects went glimmering because the lean purse supplied him forced him to rely on second-hand automobile engine power and homemade or obsolete machinery. Worse yet is the plight of a man who must use some new and untried piece of equipment designed by a promoter or stockholder whose good intentions far outran his knowledge of mechanics and metallurgy. Few varieties of mental and physical torture will make a nervous wreck of a man more surely than will a sustained attempt to make a machine do something that is obviously beyond its power.

Labor is one of the small mine operator's chief troubles at any time, but at present it is a nightmare. With most of the younger, more adaptable men lost to Selective Service or the war industries, keen competition has developed in most mining districts for the older more experienced miners. Naturally, the larger mines hold aces in this game.

In remote localities where the experienced miner is rare in normal

Ganging up on purchases can save money

times and non-existent now, the labor problem can be solved only by hiring farmers or whatever men are available. I once worked in a camp where practically the entire crew wore high-heeled boots and ten-gallon hats. Farmers and cow-hands, let it be said, can make good miners, for they are independent, responsible individuals, accustomed to hard work. However, when potatoes sell for nearly $3 a sack, and Selective Service says the farmer must turn out so much produce or meat to be deferred, the farmer gets himself some more cows and pigs and stays home to feed them.

But suppose the small miner does succeed in getting a crew together. Sooner or later these things will happen: The government will start building an Army camp near by and will offer about $18.75 a day to anyone willing to work there, which promptly starts a gold rush in reverse. Just as the forlorn manager is watching the last of his good men disappear over the hill, somebody hands him a letter from the nearest Department of Labor office beginning, "Dear Sir: It has come to our attention that your operation is in violation of paragraph z, Section XXXX, of the Wages and Hours Act, which reads . . . " and so on. With a bitter laugh, the manager reaches into the desk drawer for a bottle of Scotch he had cached there, only to find that the so-called bookkeeper took it with him when he left to work for Uncle Sam.

The order freezing men to their jobs means practically nothing. It is obvious that a man forced to remain on a job against his will would be an unsatisfactory worker, and in addition would spread discontent among the rest of the crew. The only remedy is to sign his release and let him go.

Mustering-out pay given by the Army also causes trouble. In our case, we maintained two men with medical discharges and small pensions, but when they got their mustering-out pay, they decided they needn't work any more and left on a protracted vacation. If this practice is established in all the nation's mining areas, the war effort will suffer.

In the matter of supplies, it is just as important for the small operator as for the large one to keep the mine running continuously; but there is one big difference: the small mine can't afford a large inventory of supplies or an experienced warehouse man. Isolated properties, of course, suffer most from this lack; and most of them try to get along on their ingenuity and a big pile of scrap iron.

One small company operating several scattered mines some distance from a large city solved the problem by having a small but well-planned storeroom at each mine. A filing system was maintained that permitted a quick monthly check on inventory by the superintendent and one helper, usually a two-hour job. By comparing the inventory with master sheets showing the exact quantities to be kept on hand, order lists were easily made out, and a quick check on supplies used in the month was obtained.

Orders from all the mines were then combined in the head office in order to obtain the reduction given with large orders. They found, however, that in purchasing machinery replacements, it was wise to let quality and not price rule the decision.

The rules governing purchase of supplies cause small operators many a sleepless night, for most of them include a small notation to the effect that any violation, which includes unknowing infraction, is punishable under Section 35(A) of the U. S. Criminal Code, with a maximum penalty of five years in prison and a $10,000 fine. The small mine operator, being just that and not a

lawyer, finds ordering under those conditions a cheerless proposition.

There seems to be a tendency to make the going tough for the small operator on the theory that his mine is less efficient than a large one. True, he has not the labor-saving machinery of the large mine, nor can he reach as low a cost per ton; but it should be pointed out that he has to sell his output in the same market as the large mines and must therefore produce about the same dollar value of metal per employee. If he doesn't, a vanished bank balance lets him know that he is no longer an operator.

Hints for Small Miners

On all these things, an alert manager can do a lot to help himself and his mine. His capital account may be kept low by utilizing as much as possible of what may be on the property, and by buying good used equipment of standard design. Labor simply must be used to the best advantage. Power costs can be kept down by planning the work to avoid large peak demands, or by holding a rigid maintenance schedule on diesels, if they are used. Supply purchases can be made in large lots at reduced prices if two or three mines will buy together. At one small mine we bought supplies in large lots and actually sold more to our neighbors, at small lot prices, than we used ourselves.

At another property, where we had good steel-sharpening equipment, we sharpened almost enough outside steel to pay our own shop cost. A custom ore business may help pay milling expenses.

Leasers, operating on some sort of split check system, are a help in opening up an old mine. One of the largest (pre-L208) California gold mines got the boost that put it over the hump when a set of leasers discovered high-grade ore at the very time the local bank was refusing the management a small loan with the surface equipment as security.

Another California mine, which possessed its own hydroelectric plant, worked for several years at no profit from the mine, but showed a nice balance on the sale of power to the nearby town, which was kept alive by the arrangement.

Not all the small mine operator's troubles are man-made, for nature often takes a hand in making the going hard. For example, at one place near Death Valley, Calif., we had to bring water from a well 10 miles away through a pipeline laid across a wide valley. In the center of the valley, where about 300 ft. of static head prevailed in the pipe, the soil had a tendency to pit the pipe, and the smallest leak at this pressure would waste all the water. Leaks were repaired by using inexpensive mechanic's "C" clamps put on, with a piece of inner tube, over the leak. Several hundred clamps were purchased and used, and once a year in summer the line was drained and all leaks were welded. The clamps were kept in a barrel of diesel oil for cleaning before re-use.

The technique of stopping these leaks varied with the weather. In winter, with a cold wind sweeping across the sagebrush, one soon learned to approach a leak from windward; but in summer one hauled up from leeward because a little spray was welcome.

The reverse of the desert mine's problems is found in a small mine high in the Colorado Rockies near the end of a hard winter of several months of continuous blizzards. Roads are laboriously opened only to be immediately closed again. The old tractor, working day and night, is sure to break down, and though it is difficult today to get spare parts, it is harder still to get them up the mountain on a toboggan. The water line freezes and breaks somewhere down under 15 ft. of snow. The mill shuts down because ore can't be hauled from the mine on account of snow, or because of water shortage, or because the concentrate bin is full and trucks can't leave the property, or because the millmen are busy shoveling snow off the mill roof before it caves in.

At that moment, some female trouble maker has a difference of opinion with the schoolteacher over the children and asks—nay, demands —that every activity be centered in plowing out the roads so that she, her children, and her well-nigh indispensable husband can leave camp forthwith. With the road open, several other men seize the opportunity to leave, too.

Even wild animals contribute generously to the small miner's troubles. Every manager is familiar with the surge in absenteeism that coincides with hunting and fishing seasons, but individual animals sometimes act more directly.

For example, last fall, the bear that had lived well for several years on camp garbage began to find himself still hungry after each meal. Not being familiar with OPA regulations, he couldn't understand why he was being rationed and he took to prowling the camp at night trying to augment his diet. After he had torn off a screen, gone through a window, and demolished a butcher's chopping block, the camp's people served notice that either the bear went or they did.

So, with the help of beginner's luck, the bear was duly trapped and shot. The hide made a beautiful rug, and the keeper of the boarding house rubbed her hands at the prospect of all that free and pointless meat. I thought we were well out of that crisis, but I crowed too soon. Now, bear meat, prepared in a pressure cooker, is not too bad, but one tires of it quickly. Also, there were only a few men at the boarding house, and the bear was a large one. When the dust finally settled, I resolved firmly to chase the next bear out of camp unharmed.

Perhaps the whole substance of this article could be expressed in the statement that the small mine operator may die of overwork or worry—but never of boredom.

General Outlook For Mining

The February number of E.&M.J., in addition to the customary annual review covering minerals, metals, and various mining techniques, will contain an analysis of the general outlook and adjustments which mining faces, which, the editors believe, will be deeply interesting to our readers.

Transfer Scraping Capacity Increased–Upkeep Reduced

HAROLD KRAMER, *Mine Engineer, Hudson Bay Mining & Smelting Co., Flin Flon, Manitoba*

PRESENT SCRAPING PRACTICE in the so-called "scram," or transfer, drifts in the mine of Hudson Bay Mining & Smelting Co., at Flin Flon, Manitoba, embodies radical changes compared with that originally employed. Together with the use of such drifts, it is an outgrowth of experiments conducted over a period of years. In the accompanying table are given the descriptive details, or specifications, of the 150-hp. double-drum slusher hoist, as well as of the scraper and the lead and tail ropes. In contrast with the limited capacity of the 50-hp. hoists and 48-in. scrapers first employed and the 75-hp. hoists and 60-in. scrapers that followed them, the present scraper unit has an indicated maximum capacity of 252 tons per hour. Repair and maintenance expense has been considerably reduced.

In the scraping unit originally laid out, the scram drift was silled off at 10 ft. above the rails in the main haulage crosscut. After the back of the crosscut had been taken down and the tail drift extended for installing the slusher hoist, the opening was spanned with four 12x18-in. stringers, spaced so that the two in the center supported a 36-in. grizzly casting. The grizzly was then placed in position, and the opening outside of the grizzly casting was planked with 4 by 12-in. fir, armored with 40-lb. rails. The scram drift itself was driven flat.

The 50-hp. Sullivan double-drum electric hoist first installed operated a 48-in. hoe-type scraper, with lead and tail lines of $\frac{3}{4}$-in., 6x19 plow-steel wire rope. The tail rope was run over an 18-in. roller-bearing snatch block anchored in the rock at the end of the scram drift. The unit operated up to expectation, but had closely limited capacity.

Careful study of the operating characteristics opened up a new field for experiment, and the 50-hp. units were replaced with 75-hp. Sullivan hoists, the largest constructed at the time. Scraper width was increased from 48 in. to 60 in., and the arc design was adopted after trial of various types and elimination of unsuitable designs.

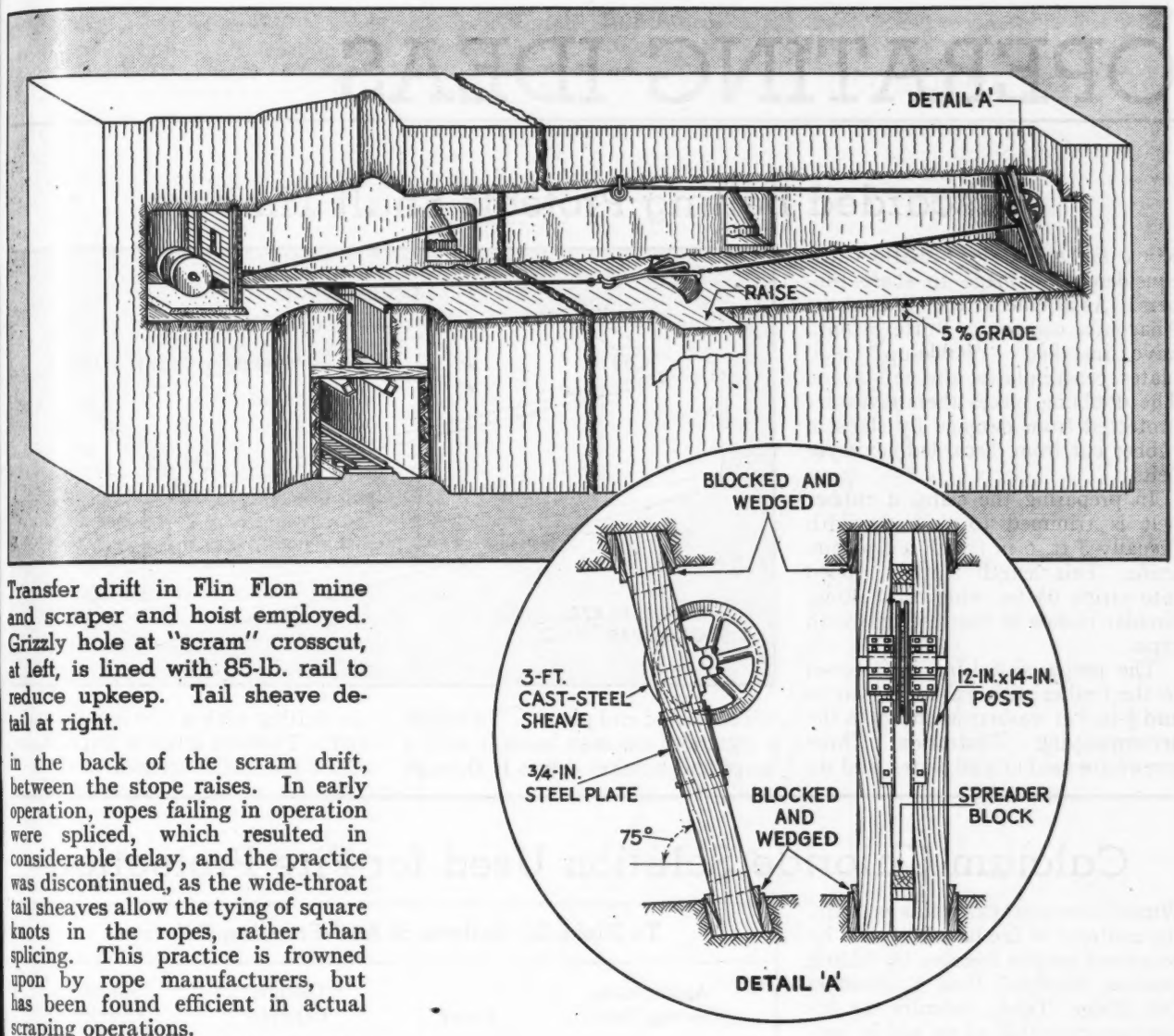
Ropes were also given careful study, and trial was made of all types and classes available, including 6x7, 6x19, and 6x27 construction in Lang's lay, Trulay, and regular lay, both in manila and steel center, and in various grades of steel. The practice finally adopted as standard called for $\frac{7}{8}$-in. 6x7, best plow-steel rope, with regular lay, for the lead ropes, and $\frac{7}{8}$-in. 6x19, best plow-steel rope with regular lay, for the tail ropes. Both ropes were purchased with manila centers.

Simultaneously, experiments were carried out with tail blocks, resulting in the adoption of an extra heavy cast-steel 24-in.-diameter standard sheave, with a special wide throat. The sheaves were mounted between 12x18 in. fir posts set upright in hitches in the end of the scram drift.

Rope failure, it was found, was due more to abrasion than to actual stresses, the abrasion resulting from the rope coming into contact with the broken ore in the drift. This wear was counteracted by carrying the tail rope on idler sheaves placed

Facts About the Scraper Units Now Used in Scram Drifts at the Flin Flon mine

Power unit	150 hp. 550-v., 1,200-r.p.m. induction motor with magnetic control; pushbutton start and stop.
Drums	Diameter 32 in. Flange depth 12 in. Width at bottom 11 in. Width at top 13 in. Cast steel.
Base plate	12-in. H-beam at 60 lb. per foot, electric-welded and united.
Main shaft	Heat-treated steel S.A.E. 3240. Diameter 7.088 in.
Gears	Heat-treated steel S.A.E. 1245.
Transmission	Planetary type.
Brakes	Face $5\frac{1}{2}$-in. Raybestos-lined.
Clutches	Face $5\frac{1}{2}$-in. gravity-set, air-released.
Control	H.B.M. & S. four-way positive release valves.
Total weight	22,000 lb.
Ropes	Lead line, $1\frac{1}{2}$-in., 6x19, best plow steel. Tail line, $1\frac{1}{4}$-in., 6x19, best plow steel.
Rope speed	300 ft. per minute.
Tail sheave	Diameter 36 in. Wide throat. Shaft diameter $4\frac{15}{16}$ in. Extra-heavy pillow-block bearings supported on 12-by-20-in. vertical posts concreted in hitches.
Scraper	Arc-type, 84-in. all-manganese. Renewable arms, shoes, and cutting edges. Arms, H section, cast manganese. Tail chain, $1\frac{1}{2}$-in. anchor chain. Weight, 3,600 lb.



Transfer drift in Flin Flon mine and scraper and hoist employed. Grizzly hole at "scram" crosscut, at left, is lined with 85-lb. rail to reduce upkeep. Tail sheave detail at right.

in the back of the scram drift, between the stope raises. In early operation, ropes failing in operation were spliced, which resulted in considerable delay, and the practice was discontinued, as the wide-throat tail sheaves allow the tying of square knots in the ropes, rather than splicing. This practice is frowned upon by rope manufacturers, but has been found efficient in actual scraping operations.

The load demands placed upon the 75-hp. units proved excessive, and mounting maintenance costs were noted, a large part of which resulted from failure of the main shafts in slusher units. Replacing with nickel-steel shafts served to remedy these failures.

At this time, also, experiments were made with various degrees of incline in the scram drifts, and careful power-demand readings were taken on slusher hoist motors. From data obtained, it became apparent that a 5 percent incline provided the most efficient operation, as at this grade loads on the slusher as between scraping the ore and returning the empty scraper were equalized, and peak loads decreased. The grade of 5 percent was therefore adopted as standard, and all scram drifts have been driven on it since then.

The large amount of bulldozing required set up excessive maintenance costs for upkeep of grizzly holes at the scram crosscuts, and to offset this, 6 ft. of solid ground is now left between the back of the crosscut and the sill of the scram drift. Upkeep has been negligible since the adoption of the grizzly hole lined with 85-lb. rail. In soft ground having a tendency to wear rapidly, the area in the bottom of the scram drift, and directly in front of the grizzly, is overlaid with 85-lb. rail, which is concreted in.

To decrease repair and maintenance expense, the management decided that improvements were necessary in the design and construction of the slusher hoist. After all phases of the subject had been given careful consideration, a hoist was designed and constructed to the specifications tabulated on page 80.

Two of these 150-ft. hoists were placed in operation and five months later two more were put in service. Since then, twelve additional hoists have been installed in the underground mine. The machines have operated satisfactorily in every particular, and have proved ideal for the service for which they were designed.

Test runs were made on them, using watt-hour demand meters. In examining current and kilowatt demands, it was noted that the maximum is reached at approximately 232 hp., the peak appearing when the scraper first digs into the ore. Demand falls away rapidly once the scraper load is in motion and remains within the rated capacity of the hoist. The horsepower consumption running idle is approximately 26. Scraping a distance of 100 ft., which is approximately the average scraping distance in a 150-ft. scram drift, it was found that the scraper made a round trip in about 50 sec. Average scraper load is about 3½ tons per trip, which indicates a capacity of 252 tons per hour. In actual practice, however, this capacity is not reached, as the machine is idle between trains. The possibilities of the equipment, however, are evident, if it were necessary to operate at capacity.

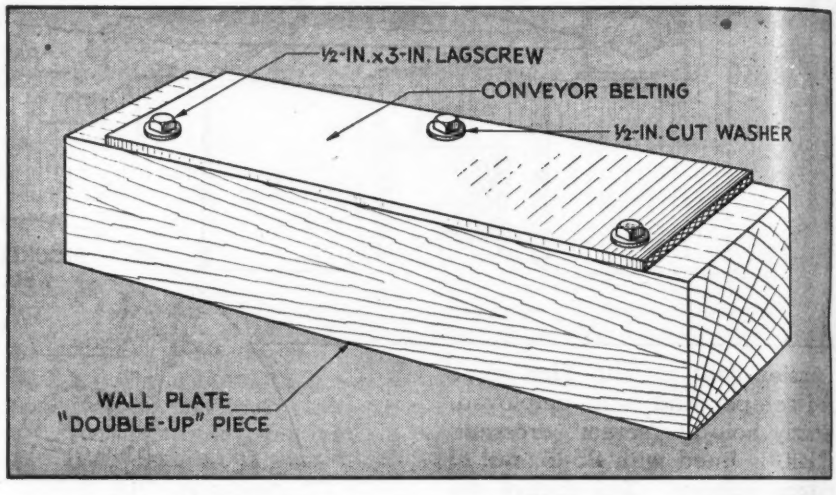
OPERATING IDEAS

Discarded Belting Protects Shaft Timbers

ROCK SPILLS in deep shafts cause considerable damage to shaft timbers. As a remedy, the mines of the Anaconda company, Butte, Mont., have installed "double-up" wall plates, center plates, and end plates. The doubling pieces themselves are protected from damage by slabs of rubber cut from discarded conveyor belts.

In preparing the slabs, a rubber belt is trimmed to desired width (usually 3 ft. 6 in.) with a linoleum knife. This length is then ripped into strips 9½ in. wide on a 40-in. circular ripsaw of the inserted-tooth type.

The prepared belting is fastened to the timber with ½x3-in. lagscrews and ½-in. cut washers as shown in the accompanying illustration. Three screws are used in wall plates, and six in center and end plates. To attach a lagscrew, one man holds it with a tongs and another drives it through the belting with a two-handed hammer. Then the screw is driven home with a pneumatic wrench.



Calcium Chloride Solution Used for Fire Protection

WHERE LOW TEMPERATURES PREVAIL, the contents of fire barrels should be protected against freezing by adding calcium chloride. Paul C. Ziemke, Oak Ridge, Tenn., submits the accompanying table as an aid in preparing solutions which will withstand freezing at various low temperatures.

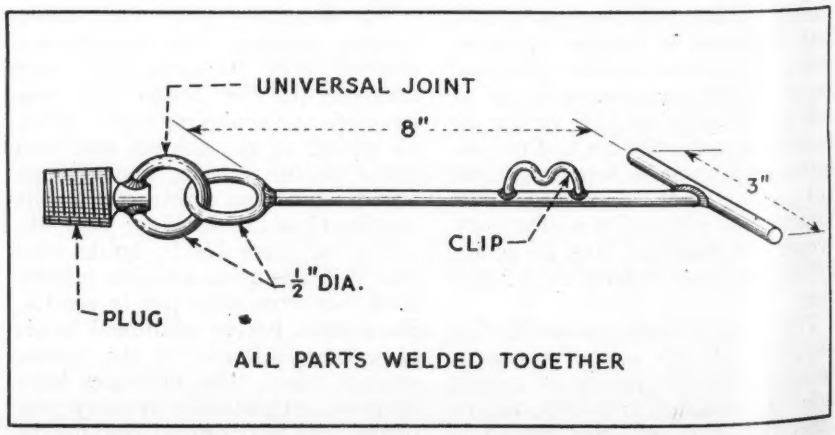
The solution should be stored in wooden barrels, as it is corrosive, particularly to copper. Calcium chloride solution should not be used to put out electrical fires.

To Make 2½ Gallons of Anti-Freezing Solution

Approximate Freezing Temp.	Water*	Calcium Chloride	Specific Gravity
+10 deg. F.	2 gal. 1 pt.	5 lb.	1.139
Zero	2 gal. 1 pt.	6 lb. 4 oz.	1.175
−10 deg. F.	2 gal.	7 lb. 6 oz.	1.205
−20 deg. F.	2 gal.	8 lb. 6 oz.	1.228
−30 deg. F.	2 gal.	9 lb. 2 oz.	1.246
−40 deg. F.	2 gal.	10 lb.	1.263

Welded Handle Simplifies Removal of Grease Plugs

GREASE RELIEF PLUGS on electric motors are often so placed that it is unhandy or even dangerous to remove or replace them with a wrench. Dick May, Wallace, Idaho, submits the accompanying illustration of an extension handle with universal joint attached which simplified the removal of relief plugs at the Tamarack mine, in the Coeur d'Alene district. The handle is made of $\frac{5}{16}$-in. rod, and the extension and rings are made of ¼-in. rod. When not in use, the handle may be suspended by a small clip which slips over a convenient screw or bolt.



Hand Drill Improved for Placer Prospecting

NUMEROUS IMPROVEMENTS were incorporated in the walking beam, or "diablo," here illustrated, according to J. A. Mitchell, assistant mechanical superintendent, Pato Consolidated Gold Dredging, Ltd., Antioquia, Colombia. The modified design, which was developed by D. W. Vaughn in the Cauca River district of Colombia, was used for prospecting gold placers.

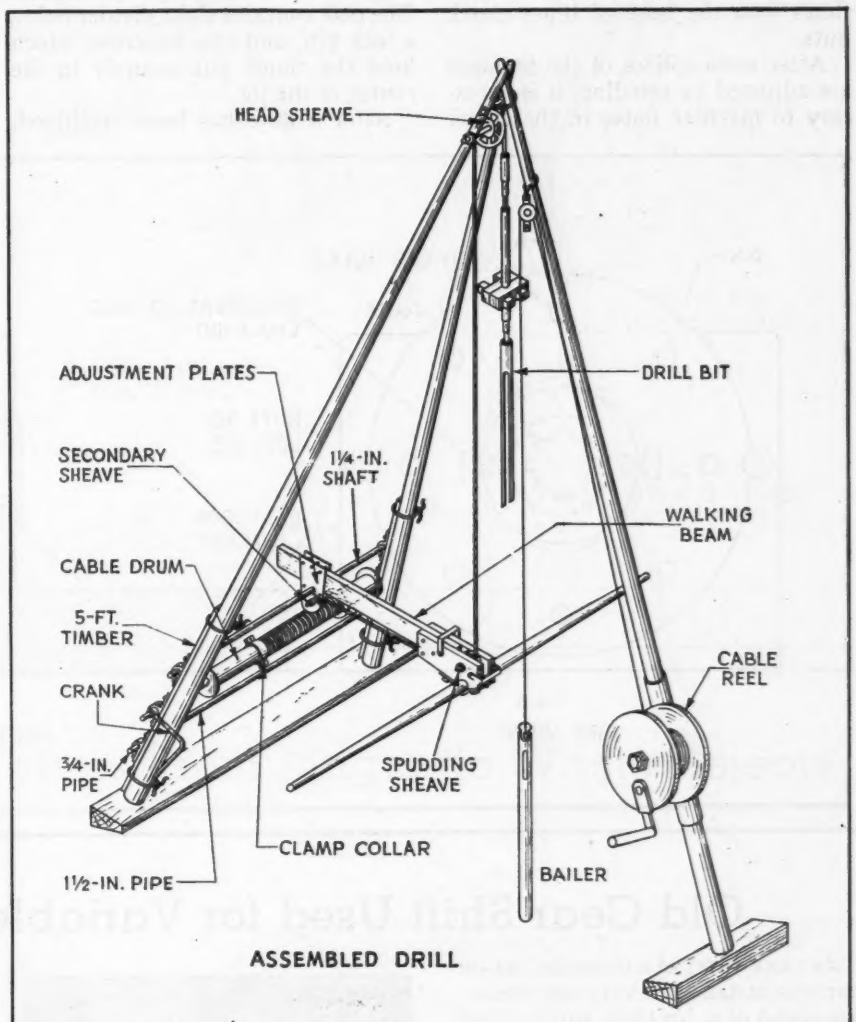
The walking beam is mounted on a 1¼-in. steel shaft with antifriction bearings and retaining collars which keep the beam centered on the shaft. The spudding sheave is conventional, but the secondary lead sheave at the foot of the beam kicks back into a bight of cable, which upon release gives the tool string a more snappy action. The length of the beam may be adjusted by loosening the plates which grip it at the lower end. Thereafter the beam may be slipped to any desired position.

The amount of cable actually in use is confined to the center of the cable drum by a clamp collar on one side of the center and a slotted disk on the other side. Extra cable is kept on the portion of the drum between the disk and the end of the drum.

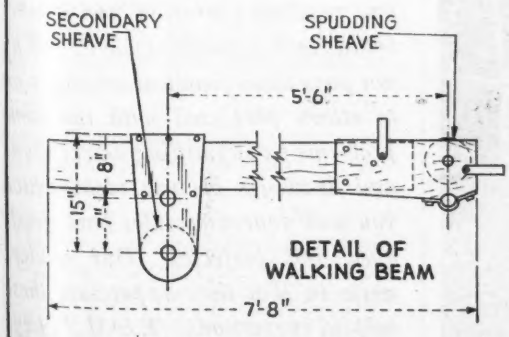
Two cranks in opposed positions on either side of the cable drum shaft are used to rotate the drum to any desired position. A 1½-in. pipe mounted below the drum contains within it a 6-in. longer ¾-in. pipe, which may be pulled out to either side to stop the cranks.

The diablo shaft, cable drum and bearings, and 1½-in. pipe are mounted to the two 5-ft. timbers, which may be clamped to any tripod cut in the field. The crown sheave is flanked by two ⅛-in. disks, 8 in. larger in diameter than the sheave. This prevents the cable from jumping off the sheave during drilling. The pump or bailer is suspended from a small sheave on a third leg of the tripod, which also supports the cable reel for the bailer. The reel is of light construction.

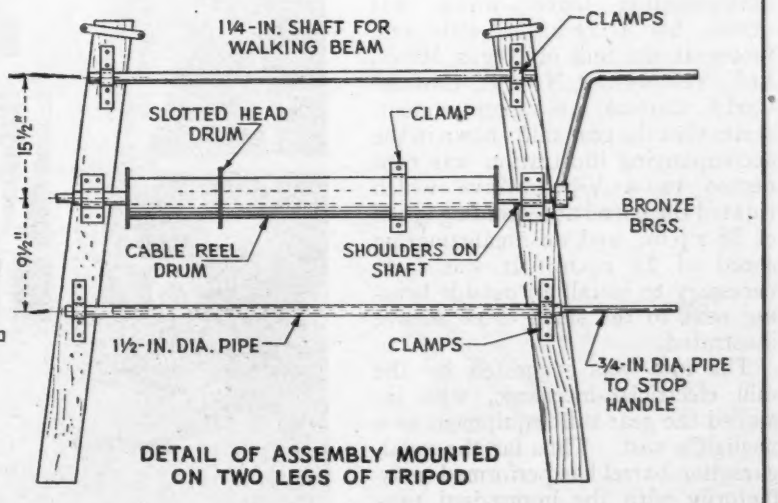
Four-legged "tripods" were necessary when drilling was done from a canoe or drill barge. However, where drilling operations were performed on dry ground, the three-legged supports proved satisfactory.



ASSEMBLED DRILL



DETAIL OF WALKING BEAM



DETAIL OF ASSEMBLY MOUNTED ON TWO LEGS OF TRIPOD

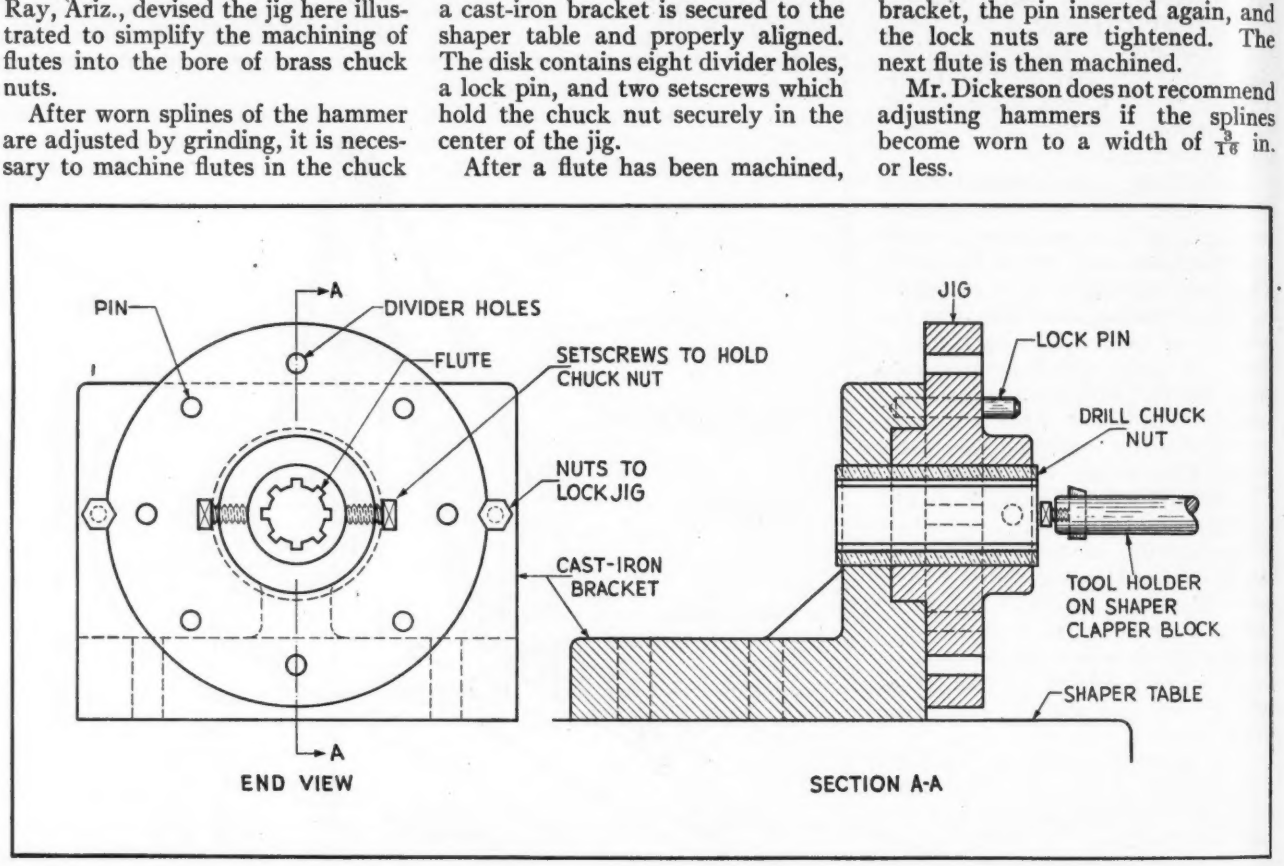
Jig Simplifies Machining of Rock Drill Chuck Nuts

CONFRONTED WITH THE PROBLEM of reusing worn rock drill hammers and providing corresponding chuck nuts, A. L. Dickerson, master mechanic of Nevada Consolidated Copper Corp., Ray, Ariz., devised the jig here illustrated to simplify the machining of flutes into the bore of brass chuck nuts.

After worn splines of the hammer are adjusted by grinding, it is necessary to machine flutes in the chuck nut to correspond to the splines. To avoid usual time-consuming and tedious conventional methods in performing this task, a jig consisting of a circular disk or flange revolving in a cast-iron bracket is secured to the shaper table and properly aligned. The disk contains eight divider holes, a lock pin, and two setscrews which hold the chuck nut securely in the center of the jig.

After a flute has been machined, the two locknuts holding the jig to the brackets are loosened, the pin in the divider hole is removed, the jig turned until the next divider hole is in perfect alignment with that in the bracket, the pin inserted again, and the lock nuts are tightened. The next flute is then machined.

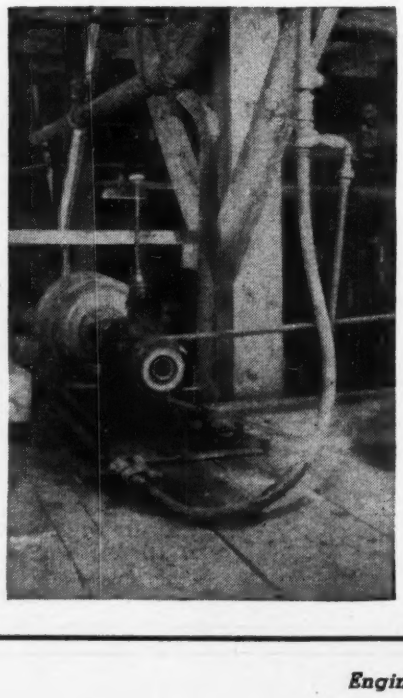
Mr. Dickerson does not recommend adjusting hammers if the splines become worn to a width of $\frac{3}{16}$ in. or less.



Old Gear Shift Used for Variable-Speed Drive

THE GEAR SHIFT of a discarded motor car was installed to vary the operating speed of a 36x48-in. rubber-lined amalgamating barrel which was driven by a 7½-hp., 1,450-r.p.m. motor at the mill of Negus Mines, Ltd., Yellowknife, N.W.T., Canada. Carl R. Carlson, mill superintendent, states that the gear shift shown in the accompanying illustration was connected to a V-belt drive which rotated the barrel at a grinding speed of 38 r.p.m., and an amalgamating speed of 21 r.p.m. It was later necessary to install an outside bearing next to the small drive sheave illustrated.

The idea was suggested by the mill electrician-mechanic, who installed the gear shift equipment at a negligible cost. Thus far the amalgamation barrel has performed satisfactorily with the improvised two-speed drive.



Troubled With Bugs?

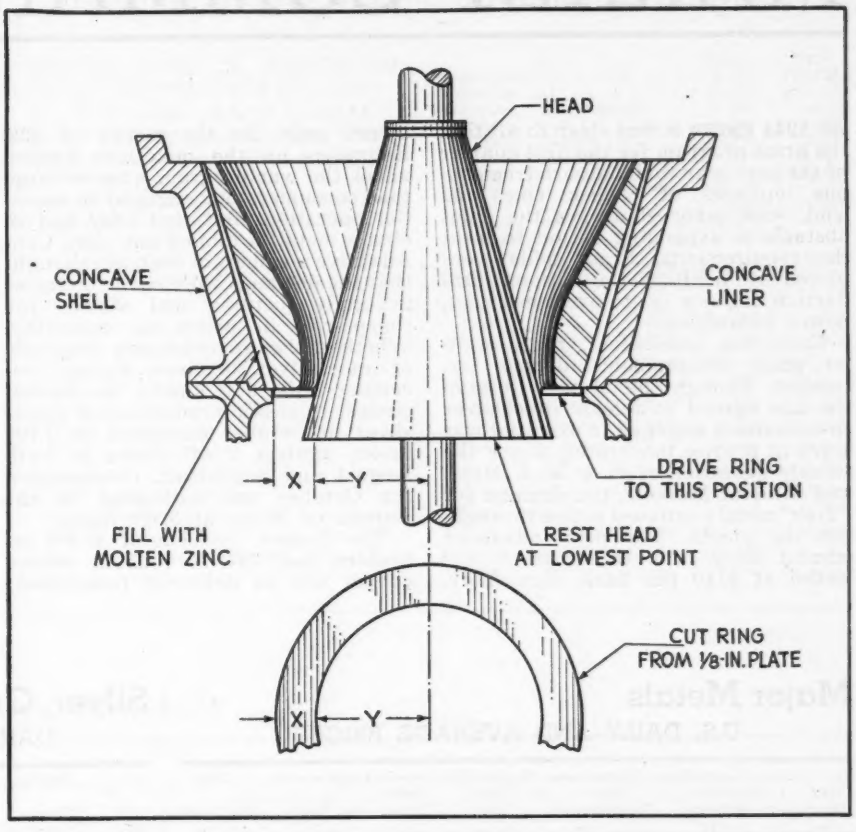
Operating bugs have to be ironed out in nearly every mining, milling, and smelting operation, and it takes brains and ingenuity to do it. Why not pass these practical solutions on to others perplexed with the same problems by submitting descriptions and drawings of new ideas which you and your associates have developed and perfected. Our readers write in that they appreciate these helpful suggestions. E.&M.J. pays $5 or more for each item published.

Resetting Concave Crusher Liners Increases Life

THE LIFE OF CONCAVE LINERS for crushers may be extended by resetting them for finer grinding after an initial wearing period. The following instructions for resetting the concaves on a McCully crusher are suggested by William Tinto, plant mechanic, Mountain Copper Co., Ltd., Matheson, Calif.

Cut a flat ring from a $\frac{1}{8}$-in. plate with dimensions as shown in the accompanying drawing. Then drive the ring over the head and to the bottom of the concave shell and fill the joints between the ring and the shell with cold-seal furnace clay. Set the concave liners to any desired position, and fill the joints between them with clay. Fill the space between the concaves and the head with hot, dry sand. Pour molten zinc to fill the spaces between the backs of the concaves and the shell. After the zinc has set, cut the $\frac{1}{8}$-in. plate ring into sections with a torch and remove the sections from the discharge well of the crusher.

Additional information on this subject may be found in instruction booklets for McCully crushers published by Allis-Chalmers Mfg. Co.

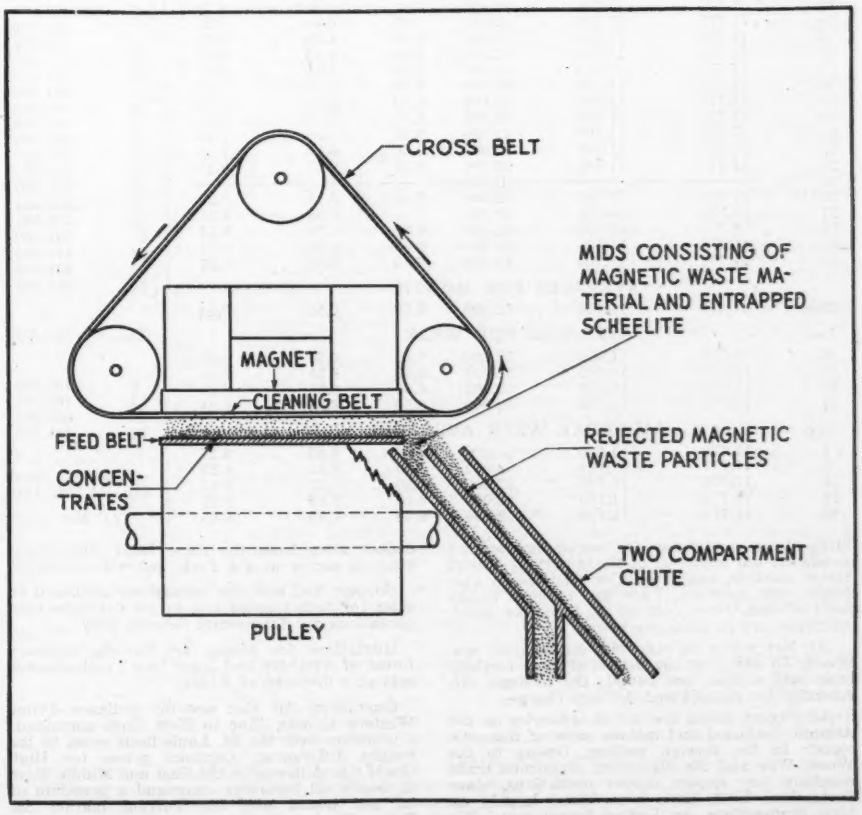


Chute Recovers Values From Magnetic Waste Rejects

IN USING A MAGNETIC SEPARATOR to clean tungsten concentrates, George C. Bush, mill superintendent of Imperial Smelting & Refining Co., Darwin, Calif., noted that values were entrapped with the magnetic waste particles which adhered to the cross belt. It was further noted that when the cleaning belt passed out of the magnetic field and started to discharge its load, heavier particles containing tungsten values fell away from the belt sooner than the lighter magnetic waste materials.

By building a two-compartment chute as shown in the accompanying illustration, an appreciable percentage of values which would ordinarily have been lost were recovered as a middling product. The middling product consisting of magnetic waste material and entrapped scheelite was returned to the mill circuit for regrinding or recleaning. The chute installation cut scheelite losses from 8 percent to 2 percent.

The gap between the cleaning belt and the feed belt was set at $\frac{3}{16}$ in., but could be adjusted to treat concentrates of varying coarseness.



MARKET SUMMARY

AS 1944 ENDED it was clear to all that the arms program for the first quarter of the new year would absorb tremendous tonnages of copper, zinc, and lead, with labor shortages the chief obstacle to expanding output to meet the requirements. Brass mills were placed by WPB on the national production urgency list to overcome manpower difficulties.

Excepting quicksilver, there were no price developments during December. Though the Metals Reserve Co. has agreed to release quicksilver to consumers engaged in essential war work at a price moderately above the weekly quotation of E. & M. J. Metal and Mineral Markets, the demand for "free" metal continued active throughout the month. The price advanced almost daily in a thin market, and ended at $140 per flask, New York, a net gain for the month of $22. Estimates on the quantities needed under the war program were so large that consumers not engaged in essential operations felt that they had to obtain metal at almost any cost. Conservative n embers of the trade thought that the demands were not as great as generally pictured and viewed the sharp rise in prices as unhealthy. Whether the government's stockpile of quicksilver declined during December was not known in market circles. Domestic production of quicksilver in October amounted to 2,700 flasks, against 2,500 flasks in both August and September. Consumption for October was estimated by the Bureau of Mines at 3,900 flasks.

The Copper Division of WPB estimates that 457,400 tons of refined copper will be delivered (consumed) during the first quarter of 1945. The supply available for the Jan.-March period is estimated at 494,000 tons. With domestic production likely to shrink moderately, owing largely to labor shortages, increased supplies will be obtained from abroad. In fact, it was stated that copper will flow into this country from Africa and Canada, in addition to the regular tonnages purchased in Latin American countries. Second-quarter requirements will be even larger than those indicated for the first quarter, with the supply about the same.

The Copper Institute's figures for November showed output of crude as amounting to 76,079 tons, against 82,653 tons in the preceding month. Production of refined was 87,145 tons in November, against 89,068 tons in October. Deliveries in November (do-

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944 Dec.	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin: New York	Lead: New York	Lead: St. Louis	Zinc: St. Louis
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
5	11.775	11.700	52.000	6.50	6.35	8.25
6	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
12	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
25			Holiday			
26	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
			AVERAGES FOR MONTH			
Dec.	11.775	11.700	52.000	6.50	6.35	8.25
Dec.			AVERAGES FOR WEEK			
6	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
Dec.			CALENDAR WEEK AVERAGES			
2	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(*a*) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(*b*) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1944 Dec.	Sterling Exchange: "Checks" (Nominal)	Sterling Exchange: "90-day demand"	Silver: (c) New York	Silver: London	Gold: London	Gold: (d) United States
1	401.000	(f)	44.750	23.500	168s.	$35.00
2	401.000	(f)	(e)	(e)	(e)	35.00
4	401.000	(f)	44.750	23.500	168s.	35.00
5	401.000	(f)	44.750	23.500	168s.	35.00
6	401.000	(f)	44.750	23.500	168s.	35.00
7	401.000	(f)	44.750	23.500	168s.	35.00
8	401.000	(f)	44.750	23.500	168s.	35.00
9	401.000	(f)	(e)	(e)	(e)	35.00
11	401.000	(f)	44.750	23.500	168s.	35.00
12	401.000	(f)	44.750	23.500	168s.	35.00
13	401.000	(f)	44.750	23.500	168s.	35.00
14	401.000	(f)	44.750	23.500	168s.	35.00
15	401.000	(f)	44.750	23.500	168s.	35.00
16	401.000	(f)	(e)	(e)	(e)	35.00
18	401.000	(f)	44.750	23.500	168s.	35.00
19	401.000	(f)	44.750	23.500	168s.	35.00
20	401.000	(f)	44.750	23.500	168s.	35.00
21	401.000	(f)	44.750	23.500	168s.	35.00
22	401.000	(f)	44.750	23.500	168s.	35.00
23	401.000	(f)	(e)	(e)	(e)	35.00
25	Holiday	Holiday	Holiday	Holiday	Holiday	Holiday
26	401.000	(f)	44.750	Holiday	Holiday	35.00
27	401.000	(f)	44.750	23.500	168s.	35.00
28	401.000	(f)	44.750	23.500	168s.	35.00
29	401.000	(f)	44.750	23.500	168s.	35.00
30	401.000	(f)	44.750	23.500	168s.	35.00
			AVERAGES FOR MONTH			
Dec.	401.000	..	44.750	23.500	..	35.00
			AVERAGES FOR WEEK			
6	401.000	..	44.750	..	..	
13	401.000	..	44.750	..	..	
20	401.000	..	44.750	..	..	
27	401.000	..	44.750	..	..	
		..	..	..	..	

Calendar week averages, New York Silver: Dec. 2nd, 44.750; 9th, 44.750; 16th, 44.750; 23rd, 44.750; 30th, 44.750.

(*e*) Not quoted (Saturday). (*f*) No quotation.

(*c*) Silver other than newly-mined domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70⅝c. throughout December.

(*d*) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

mestic and foreign copper) amounted to 127,517 tons.

To maintain an adequate reserve supply, WPB took action late in December to restrict consumption of lead in most civilian applications to 60 percent of the tonnages consumed in the first half of 1944. The flow of lead into military uses will not be curbed. Use of lead in some minor civilian items has been stopped. Domestic production of refined lead in November amounted to 42,842 tons, against 42,997 tons in October. An effort will be made to increase domestic production of lead as well as imports.

Deliveries of zinc will increase substantially in the first quarter, the industry believes, and there is hope that the stockpile will be reduced in this period of increased production for war. Stocks of zinc at the end of November amounted to 246,172 tons, the American Zinc Institute reports.

WPB amended the tin restriction order to tighten the controls.

The E. & M. J. price index of nonferrous metals for December was unchanged at 88.74 for the 28th consecutive month.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for November and December.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations, (e) Special shapes sold to platers.

	Nov.	Dec.
Quicksilver, N. Y. flask	116.304	128.880
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

Yearly Average Prices—1940-1944

	1940	1941	1942	1943	1944
Copper, domestic, f.o.b. refinery	11.296	11.797	11.775	11.775	11.775
Copper, export, f.o.b. refinery	10.770	10.901	11.684	11.700	11.700
Lead, common, New York	5.179	5.793	6.481	6.500	6.500
Lead, common, St. Louis	5.029	5.643	6.331	6.350	6.350
Zinc, Prime Western, St. Louis	6.335	7.474	8.250	8.250	8.250
Tin, Straits, New York	49.827	52.018	52.000	52.000	52.000
Silver, foreign, New York	34.773	34.783	38.333	44.750	44.750
Quicksilver (per flask 76-lb.)	$176.865	$185.023	$196.346	$195.208	$118.358
Antimony, domestic, New York	14.000	14.000	15.559	15.928	15.839
Platinum, refined	$37.924	$36.000	$36.000	$35.083	$35.000
Cadmium (producers' quotation)	79.920	88.443	90.000	90.000	90.000
Aluminum, 99 plus percent	18.691	16.500	15.000	15.000	15.000

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated
(Jan. 2, 1945)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb.	$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots, 97@ 98 percent, cast	$1.85
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	$1.50
Indium, troy oz.	$7.50
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation) troy oz.	$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	$140.00
Selenium, 99.5 per cent, lb.	$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50 nom.
Titanium, 96 to 98 per cent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$14.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio	$41.00
48% Cr_2O_3 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.75
Mesabi bessemer	$4.60
Old Range non-bessemer	$4.60
Mesabi, non-bessemer	$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 60 per cent, duty paid	$24.00
Domestic, 60 per cent and upward	$24.00@$24.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$55.28
(a) Prices at mines, small lots, normally several dollars less.	

METALLIC COMPOUNDS

Arsenic Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	$1.84
Copper Sulphate, 100 lb.	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per pounds of Cr. contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum, 55 @ 65 per cent Mo. lb. of Mo. contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.60@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V, delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U.S. funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$8.50@$9.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$8.25@$8.50
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 60 per cent, all rail movement, ton	$30.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica — Colonial Mica Corp., agent for Metals Reserve Co., offered to buy No. 1 and No. 2 domestic sheet mica, 1½ and 2 in. and larger, full trim, at $8 per pound from Aug. 7 to Mar. 31, 1945. Those who wish to sell on a three-quarter trim basis will obtain $6 per pound, as previously stated.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of s, c i f, Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50
200 mesh, cream colored	$26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$23.50
Steel, base price, Pittsburgh Billets, gross ton	$34.00
Structural shapes, 100 lb.	$2.10

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

WPB Order Restricts Lead for Civilian Uses

Use of lead for most civilian applications is being restricted to 60 percent of the base period, the first half of 1944, under the revised version of Order M-38, announced in Washington December, 27, 1944.

The order contains three lists: first, group "A," applies to some minor civilian items in which lead has been officially banned; the second, group "B," covers military uses, storage batteries, cable covering, tetraethyl lead, ammunition, and a few non-military uses such as solders, bearing metals, and brass and bronze, for which lead will be available without restriction; and group "C," which contains the civilian items that fall into the 60 percent classification.

Officials believe that over-all consumption of lead will be reduced 15 to 20 percent, closing the gap between 1945's estimated requirements of 1,150,000 tons and estimated supplies of 970,000 tons. Officials expect that the stockpile position will improve if the government's effort to provide more labor for domestic production of both primary and secondary lead is successful, and if additional lead can be secured from foreign sources. The cutback, it is pointed out, is not for the purpose of adding to the existing stockpile.

Manpower Shortage Affects Slab Zinc

The stepped-up ammunition program is not expected to develop shortages of either copper or zinc. Increased requirements for copper can be met in stride. Unofficial opinion in Washington is that the worst that can happen is that some additional copper may have to be brought in from foreign sources.

Zinc, currently one of the easiest of the non-ferrous metals, is in a less comfortable situation. The manpower problem at the smelters is becoming serious. Some plants are reported to be operating at only 20 percent of capacity. Others have closed completely and all have had their operations adversely affected by lack of sufficient labor.

In view of the enlarged cartridge brass program, the present ample zinc stockpile could be depleted rapidly if smelter production is sharply curtailed. In this connection it should be remembered that a substantial part of the zinc stockpile is in the form of concentrates. On the other hand, the brass industry, also hit by labor shortages, may not absorb as much metal immediately as was believed when the military program was first announced. Zinc producers themselves do not expect the stepped-up requirements for ammunition to be felt in the form of immediate strong demands for metal. They believe that there will be a continuing demand over a longer period of time. One result may be continuation of the premium quota plan beyond its expiration date, July 31, 1945.

Bureau of Mines Is Being Reorganized

Further reorganization of the Bureau of Mines is under way. This is another step in the series of changes started last summer when George Lamb was made executive assistant to Dr. R. R. Sayers, director of the Bureau. Although final approval had not been received for the entire plan, certain moves were put into effect the middle of December and will continue in later weeks as the necessary authorization is secured. The portion affected in the latest reshuffle is the Division of Mining and Metallurgy, under Reginald Dean, assistant director.

The new plan would abolish the Washington staff and the four regional offices and establish nine area offices in this country and one in Alaska. In each office there will be a head of mining activities and another of metallurgical activities. Both men will report direct to Washington through one of two assistants to be named for Dr. Dean. Straight-line control will be effected by this means. It also sets up a New Deal type of dual responsibility that has resulted in internal strife everytime it has been tried. It failed twice at the War Production Board.

No official statement could be obtained at the time of writing, but it was believed that the economics and safety branches of the Bureau would not be affected.

In the Fuels and Explosives Branch of the Bureau a new Oil Shale Section has been set up in the Petroleum and Natural Gas Division. The head of the Oil Shale Section is Albert J. Kraemer. H. P. Rue will be in charge of the new laboratory at Laramie, Wyo. Boyd Guthrie will be the supervising engineer of the oil-shale demonstration plant and Tell Ertl the supervising engineer of oil shale mining.

Mica Producers to Face Anti-Trust Investigation

At an all-day hearing at Shelby, N.C., on Dec. 13, United States District Judge E. Yates Webb quashed subpoenas issued some time ago by the government requiring a number of mica mining companies to produce their records on handling and processing of mica during the past 16 years for inspection by the court.

Government attorneys, in issuing the subpoenas recently, indicated that they wanted the records for a grand jury investigation in connection with suspected violations of the Sherman Anti-Trust laws. The companies contended that it was physically impossible to meet the terms of the subpoenas and that attempts to produce records extending back 16 years would seriously hamper their part in the war effort.

In quashing the subpoenas, Judge Webb stated that he would allow new subpoenas to be issued covering records for the past four years, and U.S. District Attorney Lamar Caudle said that the new subpoenas would be issued within a few days.

Represented at the hearing in Shelby were the Asheville Mica Co. of Asheville, N.C.; the Richmond Mica Mining Corp., Richmond, Va.; the English Mica Co., Spruce Pine, N.C.; Eugene Minsell Co., New York City; A. O. Schoonmaker Insulation Co., New York City; and the Mica Insulation Co., New York City. Companies named in the original subpoenas, but not represented at the hearing, were the Mica Fabrication Co., the Wet Ground Mica Association, and the National Electrical Manufacturers Association, all of New York City. Caudle said the latter three companies were absent with the concurrence of the government, and that they had advised that their records are open to the government for inspection at any time, but that it would be difficult to transport them to Shelby.

Expanded Mercury Needs Lead to Shortage

The nation is back in the war as far as the production of metal is concerned. Mercury, one of the first metals to have its purchase program dropped, is in less plentiful supply. By the first of December, the shortage of "free" metal was so acute that it was decided to tap the government stockpile to meet war needs.

Various rumors are going around Washington and elsewhere to explain the shortage. Investigation of the situation indicates that the real cause is declining production and increased usage.

About a year ago, consumption of mercury fell off, and was followed by a natural decline in production as the market price went down. About the

time the industry hit bottom, new requirements made their appearance. It was not until some months later, when stocks moved into strong hands, that the new situation made itself felt, and was followed by the decision to release mercury from the government's large stockpile.

Officially, it is stated that "this action will fill the gap between production plus imports and essential requirements." At the time the announcement was made, the price at which mercury would be sold by Metals Reserve was roughly two dollars per flask above the quoted market level. This was, of course, considerably below the ceiling price.

General policy of Metals Reserve in putting mercury into regular trade channels has not yet been settled. The regular policy of MRC is to distribute only to users. But if this policy should be carried out in the case of mercury, the number of users and the small quantity involved in many instances would probably mean that many users would have to go without.

At the time of the announcement that releases would be made from the government stockpile, it was apparent that the shortage was not due to speculative holding. The stockpile would make speculation very dangerous. There is no promise that the government's price policy may not be changed at a moment's notice. Metals Reserve could bring the roof in on speculators with the greatest of ease.

Tire Shortage Probably Will Affect Mining

With the exception of tires, the securing of ample repair, maintenance, and operating supplies for the mining industry is not expected to present any problems during the months immediately ahead. P-56, the mining repair order, was not changed during December, and no amendments to the order are in sight. This represents one of the longest periods in the history of P-56 in which there has been no tinkering.

The tire situation, discussed at some length in these columns last month, grows progressively worse. The early December announcement that the tire industry would go on a seven-day week for the next four months means that the Army will get more tires. The mining industry, other than those branches which are in Group I of the essentiality list, had less chance at the first of the year of getting new tires than in November. General Somervell has stated that "on the basis of present allocations the Army will be 472,000 tires short of its requirements for the first quarter of 1945."

Officials have expressed little hope that most mining operations can obtain tires under the circumstances. This may result in a serious production problem in many open-cut operations, or in other places where truck haulage is used.

Knoizen Leaves WPB—Returns to Industry

He held the mine supply line.

Arthur S. Knoizen, Director of the Mining Division of the War Production Board, has left Washington to resume his duties with the Joy Manufacturing Co., of which he is vice president in charge of sales and engineering. He came to work for the government on Dec. 1, 1942, bringing with him 24 years of experience in the mechanization and operation of mines. Like many other officials from private industry, he came with the expectation of remaining a comparatively short time, but has been on the job continuously for 26 months.

Mr. Knoizen joined the War Production Board as Director of the Mining Division, following Wilbur Nelson in that position. This was during the days when the Production Requirements Plan was in operation and the whole problem of priorities on materials and equipment seemed to be headed for chaos. Then the Controlled Materials Plan was substituted for PRP, and for a time it appeared as though its added complications might not only wreck the distribution system but might in so doing discredit the entire War Production Board.

Supplies Flowed Smoothly

During these difficult times, Knoizen's thorough understanding of the mining equipment field, excellent organizational ability, and tireless efforts kept the necessary equipment and supplies flowing to the mines. The manufacturers of mining equipment had their production properly scheduled, the material to meet the production schedule flowed to them smoothly, and the equipment, when made, was distributed properly. In handling this type of work the Mining Division had the full cooperation of the various end-use divisions of the War Production Board. In this way the industry was kept going. The mines got the supplies that enabled them to keep up the production of minerals so vital to success of the war production program. It could only have been done with a very thorough understanding of the problems of mining and of equipment manufacture and design.

One of Mr. Knoizen's important recent activities was a trip he made to England as chairman of the Coal Mission. This trip was arranged by the combined Production and Resources Board for the purpose of seeing if this country could assist in increasing British coal production by affording equipment, manpower, or know-how. The report of what was done on this trip has not been made public, but it is generally known that significant improvements have been made in British coal mining methods.

The Mining Division, as was set up by Wilbur Nelson and later directed by Mr. Knoizen, has done a very remarkable job. According to Mr. Knoizen, it is an organization victory. He explains it in the following words:

"Everyone of the staff is an expert in his line, and the mining industry owes them a debt of gratitude. They carried a tremendous load of detail. Without this organization, it would have been impossible to have performed our task of serving the entire mining industry."

Mr. Knoizen is leaving Washington on Jan. 15, 1945. His successor in WPB is Dr. Marcellus H. Stowe, formerly deputy director of the Mining Division.

Defense Plant Corp. Reveals Aluminum Costs

Cost figures for nine government-owned aluminum plants have been summarized by Defense Plant Corp. from reports to it as owner. The range in total of Uncle Sam's out-of-pocket expense is wide because of different conditions at the various establishments. Perhaps the most significant factors influencing costs are local power conditions and the percentage of rated capacity which could be operated. Plants of lowest over-all costs were generally operated well over rated capacity, in some cases at 115 to 120 percent of their rating.

The out-of-pocket figures summarized go from 10.4 to 16c. per pound of pig metal made. The breakdown of these figures indicates typical components of costs as follows, each in cents per pound of primary metal:

Alumina	5.3 to 5.8
Power	1.8 to 7.1
Labor	1.0 to 2.6
Carbon (electrodes)	0.9 to 1.5
Cryolite	0.5 to 1.0
Fluorite or aluminum fluoride	0.2 to 0.4
Depreciation*	0.3 to 1.0
Other items	0.5 to 3.0

* Not in "out-of-pocket" total quoted.

Very high power cost was necessary at certain locations, especially where the plants were built to meet war emergencies without regard to cost.

(*Continued on page 129*)

NEWS OF THE INDUSTRY

Gold and Silver Advocated As Base for World Money

Attributing the present worldwide monetary chaos in part to an insufficiency of gold, Francis H. Brownell, chairman of the board of directors, American Smelting & Refining Co., advocated the pegging of gold and silver prices as a partial remedy, in a paper which Frank Lilly read before the Northwest Mining Association at Spokane, Dec. 1.

Mr. Brownell stated that England, after final victory in the Napoleonic wars, pegged the price of gold at £3 17s.9d. equivalent to $20.67 per fine ounce, United States money. Losses to creditors or debtors caused by gold price fluctuations were thus eliminated, and England became the banking center of the world. More recent historical events cited were: England's temporary departure from the gold standard after the first World War; a demand in central Europe for new silver coinage because of loss of confidence in paper money; England's return to the gold standard in 1926, and subsequent abandonment of it in 1931. Mr. Brownell attributed the complete breakdown of the gold standard which followed United States' withdrawal of all gold in circulation in 1934, to a "physical insufficiency of gold." He pointed out that from 1931 to the present World War, Britain and other countries resorted to "managed currencies," stabilization agreements, national bargaining, or quota systems in unsuccessful attempts to avert uncertainty and confusion.

Because of a gold shortage, Mr. Brownell concluded that Britain would resume monetary policies followed during 1931–39, and would seek to tie to the English pound (which is not convertible into gold) the currencies of the rest of the Empire as well those of Western Europe.

He stated that Poland, Czechoslovakia, Hungary, Rumania, Bulgaria, and Yugoslavia would come under the Russian sphere of influence, and would probably use as much gold and silver as could be obtained.

Mr. Brownell suggested that the price of gold and silver be pegged and stated that "the value of silver thus stabilized would be, in effect, an addition to the supply of gold." He added that such a system "retains every advantage of the gold standard, plus the additional advantage of curing its physical scarcity."

He urged that the United States and Great Britain should agree on some way of pegging the price of gold and silver, and that the United States make the necessary loans of gold and silver to bring this about. If these countries fail to agree on a monetary plan, he emphasized that "the United States alone should undertake to fix and peg the price of both gold and silver" and freely coin and circulate its redundant supply of both metals. With such worthwhile money, he stated that the United States would enjoy the same advantage which England did by pegging the price of gold.

He concluded that "paper money will continue to be used, but tied to gold and silver and convertible thereto. This cannot be done so long as the United States locks up nearly two thirds of the world's gold and one half of its silver."

NMC Denies Wage Boost For Utah Mine Workers

Wage increases of 80c to $1.30 per shift requested by the International Union of Mine, Mill and Smelter Workers in behalf of miners of the International Smelting & Refining Co., Tooele, Utah, on the ground that the eleven Western states constitute a single labor market area wherein uniform wage scales should prevail, were denied in a majority opinion of the Non-ferrous Metals Commission of the National War Labor Board signed by John E. Gorsuch, acting chairman of NMC, on Dec. 14.

The commission reviewed the union's reasons for the request as follows: "Initially the Union repeats its demand made in these cases last year to bring the Utah rates to those prevailing in the Coeur d'Alene area of Idaho, upon a theory which would include the eleven Western states in a single labor market area and would establish the highest prevailing rates within that area as the bracket for key classifications. The increase for miners which would result from the approval of this demand is 80c. or $1.30 per shift depending on criterion used."

The commission summed up its reasons for refusal in the following statement: "One of the contentions of the Union is that the labor market area in this industry is broader than the limits of the State of Utah. Whether this is so or not, it is quite clear that the phrase, 'labor market' area as used by the National Board does not include Montana or northern Idaho in the same labor market area as Utah. Only in these two areas does one find comparable branches of the non-ferrous industry paying wage rates generally higher than those which obtain in and about Utah. Another contention of the Union is that wages should be increased to equal those paid in war industries on the West coast. But the rates to which reference is made are neither those of the non-ferrous industry nor those of the labor market area. It is therefore impossible to justify any increase in these cases on this basis."

American Mining Congress Will Meet in Washington

The annual meeting of the American Mining Congress will be held at the Mayflower Hotel in Washington on Feb. 15, 1945. Sessions will be devoted to discussions of such problems as WPB's policies of the future, metal prices and premiums, stockpiling, the outlook for the coal industry, federal tax legislation, the future of industrial relations and federal labor agencies, and the legislative outlook. Mining men will have an opportunity to meet members of the House and Senate and representatives of government agencies dealing with mining. A buffet supper will provide an opportunity for an exchange of views and experience.

United States Quicksilver Statistics

(Bureau of Mines)
In Flasks of 76 Pounds

Period	Production Average Monthly	Consumption Monthly	Stock at End of Period: Consumers and Dealers (a)	Stock at End of Period: Producers (b)	Price per Flask New York
1939	1,553	(c)1,742	12,600	376	$103.94
1940	3,148	2,233	14,100	607	176.87
1941	3,743	3,733	12,400	439	185.02
1942	4,237	4,142	10,700	1,377	196.35
1943	4,327	4,542	13,200	3,457	195.21
1944	Monthly				
January	4,400	3,400	11,300	5,459	151.60
February	3,800	3,700	9,400	5,450	130.00
March	3,800	3,600	9,900	5,011	130.00
April	3,700	3,200	9,700	5,604	128.20
May	3,400	3,100	8,900	6,171	115.54
June	3,000	3,400	9,000	5,757	101.69
July	2,700	3,000	9,300	4,025	100.56
August	2,500	3,900	9,100	2,252	104.04
September	2,500	3,900	8,400	1,936	104.28
October	2,700	3,900	7,400	2,550	109.20

(a) Largely excludes redistilled metal. (b) Held by reporting companies. (c) Apparent consumption.

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W. B. Willcox, left, R. K. Neill, center, and J. L. Drumheller, right, were in Spokane when N.W. Mining Association was formed in 1894.

N.W. Mining Association Celebrates Anniversary

Mining men of the Pacific Northwest attended the 50th annual meeting of the Northwest Mining Association at Spokane, Wash., Dec. 1 and 2. Taxation, Federal land policies, early reopening of gold mines, stockpiling, and the future of gold and silver were discussed. The program was arranged by James Leonard, Bliss Moore, Roger Oscarson, and C. O. Dunlop.

President Charles E. Marr welcomed the guests, and greetings were presented by Carl Trauerman, secretary, Montana Mining Association, and Harry C. Marsh, secretary, Idaho Mining Association. Ernest N. Patty, president, Alluvial Golds, Inc., discussed the creation of an Indian reservation in southeastern Alaska by the Department of Interior, and its effect on mines in the region. He stated that a reservation as large as Massachusetts is being created for a tribe of 40 persons at Chondalar. His views were supported by W. A. Richelson, mining engineer, Seattle, Wash., and G. H. Waterman, president, West Coast Mineral Association.

Other topics discussed included premium payments, the future of tungsten, labor supply, and the resumption of gold mining. Frank Lilly, Donald Callahan, Henry Mears, and Evan Just took part in the discussions.

At the noon luncheon, in which the Columbia Section, of the A.I.M.E. joined, with J. B. Haffner presiding, Evan Just, editor, *Engineering and Mining Journal*, spoke on problems facing the mining industry. He rejected the philosophy that United States is rapidly becoming a have-not nation, and urged mine operators to furnish data to help refute this thinking. He warned of a present world-wide drift into managed currency, and urged mining executives to take a more active part in government councils responsible for legislation affecting the industry.

R. D. Leisk and H. G. Washburn presided at the afternoon session. Mine tax problems were discussed by L. J. Hoban, Paul Jessup, and L. J. Randall, all of Wallace, Idaho. W. Earl Greenough spoke on the mineral corundum and described current work at the Fuller corundum mine, near Gallatin Gateway, Mont. Elmer E. Johnston, mining attorney, reported on the recent SEC conference at Butte, Mont. emphasizing the suggestion of Day Karr, regional administrator for SEC at Seattle, Wash., that associations create a "vigilance committee" to help police their own industry, and thus permit possible relaxation of government regulations. Plans and functions of the Nonferrous Metals Commission were presented by Charles F. Mulford.

The Saturday morning session was presided over by J. J. Curzon and Charles A. R. Lambly. Frank E. Woodside, manager, British Columbia Chamber of Mines, read a report covering mining activities in British Columbia and the Yukon. W. J. Nichols presided at the noon luncheon, and Harlan Peyton, president Spokane Chamber of Commerce, discussed light metals of the Northwest and the use of present plant facilities in the postwar era. E. McL. Tittman and C. O. Dunlop directed the afternoon and closing session. Introductory remarks by Dean E. A. Drucker, Washington State College School of Mines, were followed by C. C. March's discussion of research work on alumina which is in progress at the experimental station at Pullman, Wash.

J. H. Favorite, regional director, Federal Land Office, San Francisco, discussed the departmental attitute on mining claims in the public domain, and denied wholesale efforts to cancel unpatented mining claims. Everett Hougland, Republic, Wash., read a paper on postwar problems of small gold mine operators. Russel Caples, manager, Anaconda Reduction Plant, Great Falls, Mont., read a paper entitled "Certain Phases of the Zinc Industry."

The meeting closed with a banquet, at which Edward P. Ryan acted as toastmaster, and Dr. Harrison C. Dale, president University of Idaho, delivered the principal address.

Resolutions adopted by the Northwest Mining Association were in part as follows:

Trade Policy

The association emphatically rejected the viewpoint that the U.S. is a have-not nation in minerals, but did not resist "a moderate increase in mineral imports commensurate with the recent expansion in national industrial capacity" provided foreign trade policies would not discriminate against domestic mining.

Premium-Quota Plan

Because costs have risen under the premium system to an extent which would jeopardize normal production if premiums were removed and present ceiling prices continued, the association urged "retention of the premium-quota system until control of prices is abandoned and until operators who have made investments for war production have had a chance to recover these investments."

Tax Reforms

The group favored alteration of federal tax laws to promote development of new mines, and a change in federal income tax law to permit taxpayers "to make reasonable deduction from net income for money expended in grubstakes or primary investments in the development of natural resources."

Mineral Land Policies

The association supported the principle of discovery and location as embodied in the Federal Mining Act, and urged that discovery be presumed wherever the claim owner performs in good faith the required location and assessment work. The group opposed the federal recording of mining claims, and the adoption of a leasing system for mineral resources on public lands.

Indian Reservations

The association condemned the creation of Indian Reservations "except by specific act of Congress, after full congressional hearing in which all interested parties are represented," and advocated repeal of the Wheeler-Howard Act conferring such authority on the Secretary of the Interior. Congressional reconsideration of all Indian reservations created in Alaska was advocated.

Monetary Policy

Members favored "currency with a metallic base, using gold and silver" and indorsed the continued purchase and coinage of gold and silver, but urged the repeal of prohibitions on free circulation on gold.

Employee Relationships

The congress pledged support to all efforts designed to improve employer-employee relationships, and expressed belief that those relationships could be improved "by a limitation of three months on retroactive pay orders imposed by any federal tribunal."

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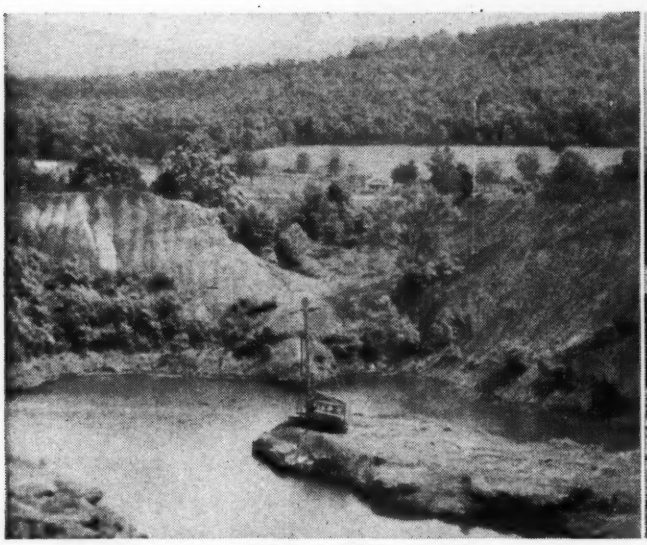

Iron Mountain mine today. Former site of old headframe is just above churn drill.

Iron Mountain mine in 1880. Ore was then mined and sorted by hand. Old shaft shown at center.

Mining Renewed at Iron Mountain, Missouri

Approximately 250,000 tons of iron ore will be produced annually from historic Iron Mountain, Missouri, by the Ozark Ore Co., a subsidiary of M. A. Hanna Co., Cleveland, which is operating in cooperation with the Defense Plant Corp. The Hanna Company holds approximately 20,000 acres of mineral land in this area lying within Iron and St. Francois counties, Mo.

Ore is mined from an open-pit area in Iron Mountain, and beneficiated in a mill producing concentrated ore containing 55 percent iron or more. Ratio of concentration is approximately 2 to 1. The concentrated ore is then shipped to the Koppers blast furnace, Granite City, Ill., which has a capacity of 1,100 tons of pig iron per day, and will serve the St. Louis steel industry.

History of the area dates back 150 years when the Spanish government deeded 16,000 acres of the area to Joseph Pratte, who was able to maintain peace between white men and Indians. The property was first mined in 1844, and the first furnace for the manufacture of iron "blooms" was built in 1846, followed by a second in 1848. Other furnaces were built in 1851 at Farmington, Mo., to which ore was hauled from Iron Mountain by oxen and mule teams. Iron from the furnaces was hauled over plank roads to packet boats on the Mississippi River at Ste. Genevieve, Mo.

The mine passed through a succession of ownerships until the Hanna company became interested in 1927 and furnished funds for exploration work. Additional orebodies were discovered, and it is now believed that there is enough ore suitable for commercial production to warrant many years of operation. There was practically no mining in the area between 1907 and 1922, when operations were renewed but lasted only a few years. Production from the Iron Mountain mine since its inception totals approximately 5 million tons.

Officers of the Ozark Ore Co. are Joseph H. Thompson, president; H. L. Pierce, executive vice president; C. N. Hickok, vice president—all with offices in Cleveland; E. E. Hunner, general manager, Duluth, Minn.; G. M. Cannon, assistant general manager, Iron River, Mich.; W. E. Dewald, superintendent, and R. H. Bartholomew, chief clerk and purchasing agent, both at Iron Mountain, Mo.

Canadian Mining Institute Meets at Vancouver

More than 400 mining men from western Canada attended the twenty-sixth Annual Western Meeting of the Canadian Institute of Mining and Metallurgy at Vancouver in November. The Hon. E. C. Carson, Minister of Mines, British Columbia, opened the meeting. After the presidential address by Alan A. MacKay, the following mining progress reports were read by representatives of the Dominion and Provincial governments: Northwest and Yukon Territories, prepared by Dr. Charles Camsell, Deputy Minister of Mines and Resources, Ottawa, was read by Dr. W. E. Cockfield, Vancouver office, Geological Survey of Canada; the British Columbia review was submitted by Hartley Sargent, chief mining engineer, Department of Mines, Victoria; the Alberta review, by John Crawford, Chief Inspector of Mines, Edminton; and the Manitoba review, by the Hon. J. S. McDiarmid, Minister of Mines, Manitoba. The Saskatchewan report, prepared by W. H. Hastings, Chief Inspector of Mines, Regina, was read by Dr. F. H. Edmunds, professor of geology, University of Saskatchewan.

The Metal Technology session convened under the chairmanship of G. S. Eldridge, H. R. Banks, superintendent of the Sullivan concentrator, presided over the milling and metallurgical session, which was devoted to general topics; and papers on crushing practice.

M. M. O'Brien, managing director of Bralorne Mines, Ltd., was chairman of the Prospecting and Exploration session, at which Franc R. Joubin presented the paper, "Compilation of Data on Prospecting." Three papers on mine operation were presented at the Metal-Mining Practice session, over which G. C. Lipsey, general superintendent of Britannia Mining & Smelting Co., Ltd., presided. Dr. H. C. Gunning, professor of economic geology, University of British Columbia, was chairman of the geology session. Master mechanics of Sullivan, Britannia, Bralorne, and Pioneer mines read papers at a symposium presided over by A. D. McGillivray.

The institute adopted a resolution requesting the Provincial government of British Columbia to investigate some means of relieving the mining industry from restrictions of the Forestry Branch which prohibits prospectors, geologists, exploration workers, etc., from traveling through the woods during seasons when fire hazards exist. To facilitate the finding of new mines by a program of making topographic maps, the meeting adopted a resolution calling to the attention of Provincial and Dominion ministers the fact that the technical personnel of the Royal Canadian Air Force are now being disbanded, and that airplanes of the type needed for mapping are probably available.

Lake Iron Ore Shipments Total 81 Million Tons

Shipments of Lake Superior iron ore down the Lakes in the 1944 season which ended with the month of November 1944, totaled 81,170,538 long tons, a decrease of 3.83 percent from the 1943 shipments, which were 84,404,852 long tons. The all-time high mark was scored in the 1942 season, when Lake shipments were 92,076,781 long tons.

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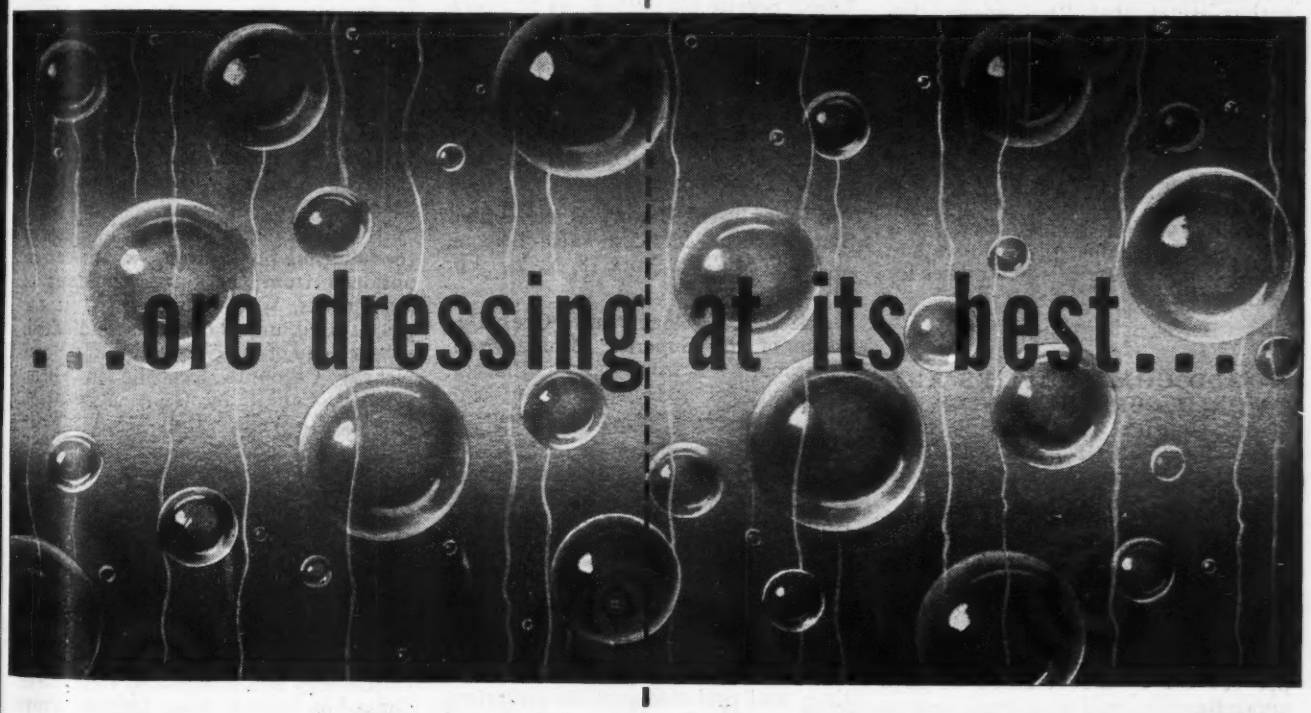

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NEW BOOKS

METALS AND ALLOYS DIRECTORY. By M. Merlub-Sobel, Ph.D. Chemical Publishing Co., Inc., Brooklyn, N.Y. Pp. 238. Price $4.50.

A new reference book containing over 10,000 definitions of metallurgical terms, alphabetically arranged from "Angstrom Units" to "Zyglo Process." The definitions include composition, properties, and uses of the important commercial alloys; the physical constants and properties of the elements; description of equipment and processes used in modern metallurgy, and other pertinent information. In the preface the author states that "no concise dictionary of metallurgical terms, adapted to American needs, has hitherto been available," and he expresses the hope that the present volume will, to some extent, fill the void. Examination of the book reveals broad coverage of the subject of metallurgy, with respect to ore treatment as well as the physical metallurgy of the common metals and alloys. Trade names of processes and products are included, which makes for ready reference.

WORLD COMMODITIES AND WORLD CURRENCY. By Benjamin Graham. McGraw-Hill Book Co., New York 18, N. Y. Pp. 182, price $2.

A discussion of various aspects of a plan for a commodity-reserve currency system, espoused jointly by the author and Frank D. Graham (see "Postwar Monetary Standards," E&MJ, Sept. 1944). The basic plan is not described simply in the text, but is outlined on pp. 151–153 of the volume's 60-page appendix.

The plan involves using a group of basic commodities, including copper, lead, zinc, tin, petroleum, and several agricultural products, in addition to gold as currency reserves. The objective is to provide a broad, tangible base for currency and also stabilize prices and bolster national security after the ever-normal-granary idea. The commodities would be sold whenever composite prices topped a certain level and bought when they went below a somewhat lower level. However, they could be offered or redeemed at any time in exchange for paper, and the amount in government stock would control the volume of currency in circulation, just as gold functioned under the gold standard.

From the standpoint of the general reader the treatment is rambling and abstruse, and seems to presuppose a considerable prior knowledge of the plan.

PUBLICATIONS RECEIVED

Pumps and Pumping. A group of engineering papers submitted to the Hydraulic Institute, 90 West St., New York 6, N. Y., in response to its annual contest. This group contains papers on centrifugal pumps, critical speed, steam pumps, and effect of entrained gases on rotary pumps. Price $1.50 per set, plus postage.

How to Cut Waste. By Glenn Gardiner. A manual for foremen. Elliott Service Co., 219 E. 44 St., New York 17, N. Y.

Manganese in California. Bull. No. 125, State Division of Mines, Ferry Bldg., San Francisco, Calif. With map. A cooperative summary of investigations by federal, state, and private institutions. Pp. 387.

A Brief Tariff History of the United States. The American Tariff League, 19 W. 44 St., New York 18, N. Y. Pp. 31.

Arizona. Geology and Ore Deposits of the Superior Mining Area. Eight maps. Arizona Bureau of Mines, University of Arizona, Tucson. Pp. 159. Price $1.85. Free to residents of Arizona.

Geologia do Brasil. By A. I. Oliveira and O. H. Leonardos. In Portuguese. National Department of Mineral Production, Rio de Janeiro, Brazil. Illustrated. Pp. 813.

Mercury. Report No. 4, War Changes in Industry Series. U. S. Tariff Commission, Washington, D. C. An economic study of the prewar, wartime, and probable postwar situations in the production and distribution of this metal. Pp. 20.

Lead-Zinc-Copper Deposits in the Birch Creek District, Clark and Lemhi Counties, Nevada. By Alfred L. Anderson and Warren R. Wagner. Pamphlet No. 70, June 1944, Idaho Bureau of Mines and Geology, University of Idaho, Moscow, Idaho.

How to Maintain Discipline. By B. W. Elsom. Pp. 4. Elliott Service Co., Inc., 219 E. 44 St., New York 17, N. Y.

The U. S. Bureau of Mines, Washington 25, D.C., has issued the following publications, available on application to the Director, unless otherwise indicated:

"Thermal Expansion of Pressure Samples of Hydrocarbon Liquids From Gas-Condensate Wells," by R. Vincent Smith, M. A. Schellhardt, and E. J. Dewees. R.I. 3772.

"Midget Microprojector for Dust Determinations," by Carlton E. Brown. R.I. 3780.

"A Vibrating Screen Surface for the Removal of Flat and Elongated Pieces From Crushed Stone," by Lloyd H. Banning and Frank D. Lamb. R.I. 3781.

"Mining and Milling Operations of Rutile Mine of the Titanium Alloy Co. of Arkansas Hot Spring County, Ark.," by Felix A. Vogel, Jr. I.C. 7293.

"Prospect Trenching with Caterpillar-Mounted Angledozers," by S. H. Lorain. I.C. 7294.

"Corundum," by Robert W. Metcalf. I.C. 7295.

"Blasting Hazards in Strip Mines Adjacent to Underground Workings," by J. J. Forbes and H. F. Weaver. I.C. 7296.

"Control of Silicosis Hazard by Substitution of Quartz-Free or Low-Quartz Material for Sand Under Mine Locomotives," by Carlton E. Brown and H. H. Schrenk. I. C. 7297.

U. S. Geological Survey has issued the following publications, which can be obtained from the Superintendent of Documents, Washington, D.C., at the price stated, unless otherwise indicated:

"Geology of the Grey Eagle and Some Nearby Chromite Deposits in Glenn County, Calif.," by G. A. Rynearson and F. G. Wells. Bull 945-A. Price 50c.

"Manganese Deposits of the Flat Top and Round Mountain Districts, Bland and Giles Counties, Virginia," by Harry S. Ladd and Frank W. Stead. Bull. 940-H. Price 75c.

"Chromite Deposits Near San Luis Obispo, San Luis Obispo County, Calif.," by Clay T. Smith and Allan B. Griggs. Bull. 945-B. Price 60c.

"Geology and Manganese Deposits of Guisa-Los Negros Area, Oriente Province, Cuba," by W. P. Woodring and S. N. Daviess. Bull. 935-G. Price 45c.

"Mineral Industry of Alaska in 1941 and 1942," by Philip S. Smith. Bull 943-A. Price 10c.

"McCormick Deposit, Toulumne County, Calif." Geologic maps and sections, with descriptive text. Free on request of the Director, Geological Survey, Washington 25, D.C. The following may also be obtained without charge:

"Geology of Fluorspar Deposits in the Jamestown District, Boulder County, Colo."

"Geology of Fluorspar Properties Along the Levias Fault System, Crittenden County, Ky."

"Zinc Deposits of the Mifflin-Cokenville Area of the Wisconsin Lead-Zinc District," by Allen F. Agnew and Allen V. Heyl, Jr., Geological Survey bulletin and map.

Geology of the Eva Tanguay Fluorspar Property, Tabb Fault System, Crittenden County, Ky. Large-scale geologic and topographic map, with text, available for inspection in the Washington, D. C., and Rolla, Mo., offices of the Geological Survey; also at the post office, Marion, Ky.

Aerogeology in Mineral Exploration. By William S. Levings. Colorado School of Mines Quarterly, October 1944. Pages 77. Price $1.

Mining in the Netherlands East Indies. By Alex L. Ter Braake. Bulletin of the Netherlands and Netherlands Indies Council of the Institute of Pacific Relations, 10 Rockefeller Plaza, New York 20, N.Y. 110 pages. Price 50¢.

Manganiferous Iron-Ore Deposits Near Silver City, N. M. By Lawson P. Entwistle. Bull. No. 19, New Mexico School of Mines, and State Bureau of Mines and Mineral Resources, Socorro, N.M. With maps. Pp. 72.

Stratigraphy of the Colorado Group, Upper Cretaceous, in Northern New Mexico. By Charles H. Rankin. Bull. No. 20, New Mexico School of Mines, and State Bureau of Mines and Mineral Resources, Socorro, N. M. Pp. 30.

Quebec, Canada. List of Geologic Maps published by the Quebec Department of Mines. Parliament Bldgs., Quebec, Canada.

Oklahoma. Mineral map of the State. Oklahoma Geological Survey, Norman, Okla.

Brazil. Bull. 111, Bibliografia e Indice da Geologia do Brasil, 1641–1940. By Dolores Iglesias. Pp. 323. Bull. 112, Provincia Pegmatitica do Borboremo. By E. P. Scorza. Pp. 55. Departamento Nacional Producao Mineral, Rio de Janeiro, Brazil.

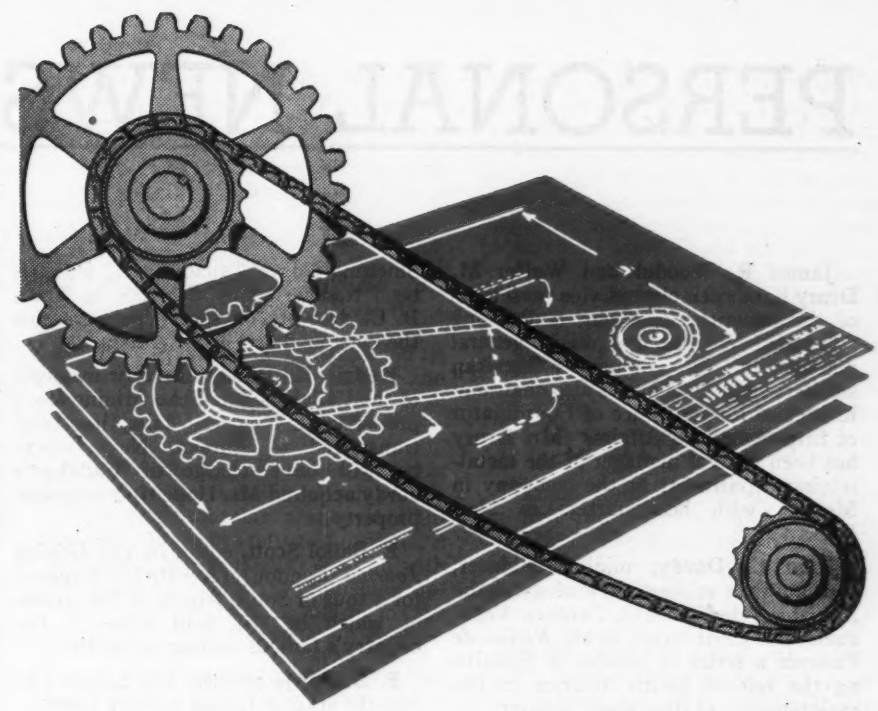
Western Australia. Annual report of the Geological Survey for 1940. Also Bull. 100 on the "Blue Asbestos Deposits of the Hamersly Ranges." Petrology and mineralogy by Keith R. Miles; economics by J. S. Foxall. Geological Survey Office, Perth, W. A.

Labor-Management Relations. A 16-p. report resulting from a national survey of industrial labor relations, with particular emphasis on employee service award systems. Published by the Labor-Management Division of the Robbins Co., Attleboro, Mass., and available on request to firms employing 300 or more persons. Ask for "Executive Study."

Careers and Mineral Industries. Circular 17, School of Mineral Industries, Pennsylvania State College, State College, Pa.

Problems of Small Business. Prepared by a special committee of the Committee for Economic Development, and devoted to postwar small business prosperity through C. E. D. community action. Published by Committee for Economic Development, 285 Madison Ave., New York 17, N. Y.

Annual Report No. 5, Inspector of Mines, South Dakota, by H. H. Stewart, Deadwood, S.D.



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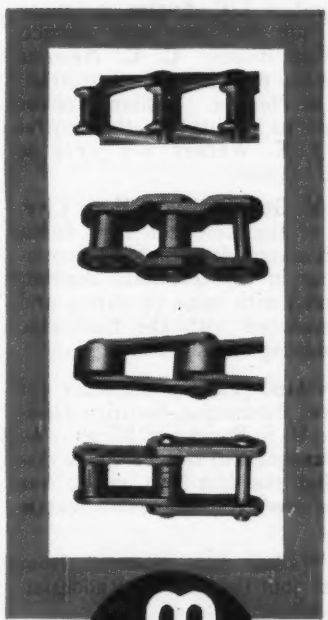

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PERSONAL NEWS

James R. Woodul and **Walter M. Drury** have been elected vice presidents of the American Smelting & Refining Co. Mr. Woodul has been general manager of the company's Mexican smelters since 1923 and is also chairman in Mexico for the Office of Coordinator of Inter-American Affairs. Mr. Drury has been general manager of the metal-mining department of the company in Mexico, with headquarters in New York.

John C. Davey, mining engineer, consultant in mining and geology to the Ministerio de Fomento, Caracas, Venezuela, has contributed to the *Revista de Fomento* a series of articles in Spanish on the role of South America in the maintenance of the steel industry in the United States.

Norman E. Sears, formerly with the Atlas Powder Co., and for some years Salt Lake City representative for Worthington Pump & Machinery Corp., is now federal explosives investigator for the U.S. Bureau of Mines, with headquarters in Salt Lake City.

Frank A. Newquist and **John Boss,** engineers from Basic Magnesium, Inc., Las Vegas, Nev., have been appointed research engineers in the mining and metallurgical experiment station, University of Utah.

E. N. Pennebaker, consulting geologist for Consolidated Coppermines Corp., Kimberly, Nev., returned lately to that point from Tahawus, N. Y., where he had spent a month at its titanium property for the National Lead Co., and has left for Globe, Ariz., to complete geological work at the Castle Dome mine for Miami Copper.

H. R. Brandenburg, metallurgist, who, under contract with the Idaho Maryland Mines Corp. at Grass Valley, Calif., has covered a wide field in perfecting a process designed to recover magnesium from serpentine, has moved from Grass Valley to Reno, where he will engage in private practice, retaining his contract relationship with Idaho Maryland.

Eric J. Schrader has been elected chairman and **Glenn L. Allen** secretary of the newly organized Northwestern branch of the Nevada section, A.I.M.E., with headquarters in Reno and including about 50 engineers living in that region. Mr. Schrader is a consulting engineer, active in Nevada for many years, and Mr. Allen is district engineer in Nevada for the U. S. Bureau of Mines, with office in Reno.

J. Victor Rogers has been released from his duties as plant engineer for Alberta Nitrogen Products, Ltd., a subsidiary of Consolidated Mining & Smelting Co. of Canada, Ltd., and has been transferred by C.M.&S. to Trail, B. C., to work on special problems for the chief engineer, **E. M. Stiles.**

Kedzie K. Hood, formerly manager of the Callahan Zinc-Lead Mining Co.'s property at Nogales, Ariz., has been transferred to Eureka, Nev., where he will have charge of Callahan's newly acquired Mt. Hope zinc-cadmium property.

E. Baliol Scott, editor of *The Mining Journal* (London), recently left England for a tour of South Africa, in the course of which he will visit some of the country's famous mining properties.

F. D. Bewis recently left England to join the staff of Indian Copper Corp.

R. C. Vivian, of London, has gone to Tanganyika to accept an appointment with New Saza Mines.

Harry S. Donald has been appointed chief engineer for Calumet & Hecla Consolidated Copper Co. He succeeds **Harry Vivian,** who has retired on account of illness.

Clifford J. Murdock, mine inspector elect for Arizona, has announced the appointment of **J. C. Anglin** as deputy inspector for the southern district, stationed at Bisbee. **C. C. Newens** will be deputy for the northern district, stationed at Phoenix. **William Kucker** will remain as deputy for the central district. **J. E. Werner** will serve as state dust engineer.

Ernest V. Gent, of New York City, secretary of the American Zinc Institute, spent several days early in December visiting in the Tri-State district. He conferred with mine operators and others associated with the local zinc and lead mining industry.

G. Cleveland Taylor, inspector for the Mineral Production Security Division of the U. S. Bureau of Mines, who has been assigned to the Tri-State district during the last two years, has been transferred to the Bureau's Seattle district.

S. E. Walker has departed from England to join the staff of Rhodesian Chrome Mines.

H. R. Hill, long prominent on the Rand, in South Africa, and manager of the Union Corp., recently retired.

Lynn Hersey, who has been general superintendent of mines for the Copper Range Company since April, 1944, has been appointed general manager of the mining division of the company, effective Jan. 1, 1945. **Fred W. Denton,** assistant superintendent of mines since July, 1944, has been promoted to succeed Mr. Hersey.

Lawrence Roe, formerly research engineer for American Potash & Chemical Corp., Trona, Calif., is now a research engineer on the staff of the Battelle Memorial Institute, Columbus, Ohio.

E. A. Pierce, manager of Southern Phosphate Corp., Bartow, Fla., recently retired. He has been identified with the phosphate industry for 40 years.

Dale L. Pitt, president of Colonial Mica Corp., New York, has resigned because of ill health and has returned to his home in Seattle, Wash.

Dr. Zay Jeffries has been elected a vice-president of General Electric Co., in charge of the newly created chemical department.

Arthur L. Flagg, mining engineer, Phoenix, Ariz., has been re-elected, for the duration of the war, as president of the Rocky Mountain Federation of Mineralogical Societies.

Robert S. Moehlman recently left Nevada for New York City to assume the duties of field geologist for the South American Development Co., 75 West St. This company has operating mines in Ecuador and British Columbia and is interested in prospects in other countries. For the past nine years Mr. Moehlman has been on the staff of the geological department of Anaconda Copper Mining Co. Prior to his work with Anaconda he served as geologist for mining companies in Canada, Mexico, and Colorado.

Fremont E. Wood, after 20 years in mining and milling activities, which included service with Basic Magnesium, American Metal Co., and Cuban-American Manganese Co., has joined the staff of the Naval Ordnance Test Station rocket motor plant at Inyokern, Calif.

M. S. Fotheringham, hitherto resident manager of Steep Rock Iron Mines, Ltd., at Atikokan, Ont., has been elected vice president and general manager.

S. H. Williston, vice president and treasurer of Horse Heaven Mines, Inc., has been elected president of the Oregon Mining Association. **Irving Rand** was elected vice president and secretary, and the following were elected directors: **Worthen Bradley,** Bradley Mining Co.; **H. C. Wilmot,** Bonanza Mines; **D. Ford McCormick,** Condero Mining Co.; **Leverett Davis,** Callahan Mining Co.; and **F. W. Watson.**

Dr. Eng. N. deVoogd advises, from Brazil, that he is now with the Cia.

Nacional de Mineracao e Forca, Sao Paulo, Brazil, which holds various coal, tin, and tungsten properties. He may be addressed at the company's office at Rua Siqueira Campos 1170, 3°, Porto Alegre, Rio Grande do Sul, Brazil. Previously, he was with the Bolivian Tin and Tungsten Mines Corporation at Huanuni, Bolivia, for six years as chief engineer and geologist.

J. W. Whiting, head of the shipping department of Cleveland-Cliffs Iron Co., retired Jan. 1. **A. W. Hamm,** formerly his assistant, succeeds him.

J. S. Foxall has been appointed State Mining Engineer of Western Australia, succeeding R. C. Wilson retired. Mr. Foxall had been assistant State Mining Engineer since 1937.

Robert M. Thompson, Geological Survey of Canada, has left for eastern Canada to study for his doctor's degree in geology.

J. M. Cummings has been appointed assistant to the director of the British Columbia Industrial and Scientific Research Council.

George W. Wigton has been appointed mill superintendent for Getchell Mine, Inc., Reno, Nev.

Fred Knight is now superintendent of Lake Superior-Holmes mine of Oliver Iron Mining Co. at Ishpeming, Mich.

Edward M. Lindenau recently manager of Minas Pampa Grande and Santa Rosa lead and zinc mines of the Hochschild interests in Bolivia, has returned to the United States and joined the staff of the U. S. Bureau of Mines at Salt Lake City, Utah, as senior mining engineer.

Guillermo Machado M. has been appointed manager of Minas de Amianto de Tinaquillo. His address is Apt. No. 1, Caracas, Venezuela.

W. A. Conley has gone to Bogota, Colombia, to make a survey of limestone deposits for Fabrica de Cemento Samper and to organize its quarry operations.

Don A. Deere, formerly with the Morenci branch of Phelps Dodge Corporation, has joined the staff of the Potash Co. of America at Carlsbad, N.M.

Elton A. Youngberg has joined the Oregon State Department of Geology and Mineral Industries, at Grants Pass, as field engineer.

M. M. Harcourt is at Warren, Ariz., with the Phelps Dodge Corp.

Virgil Miller, recently with the U. S. Bureau of Mines, stationed at Salt Lake City, has been transferred to the North Central station at Minneapolis, where he will supervise the Bureau's work in the production of sponge iron from finely ground iron ore suspended in hydrogen, using a bubble-hearth reduction furnace.

G. W. Cradduck has become general manager of Kagera Mines, Ltd., Uganda.

L. G. Hutchison has joined the staff of the British Aluminium Co., Ltd., on the African Gold Coast.

Richard A. Young, manager of the Dumas (Tex.) smelter of the American Zinc Co. of Illinois, has been elected a director of the company.

Prof. B. W. Holman has accepted an appointment to the chair of mining and metallurgy at King Fuad University, at Cairo, Egypt.

Norman Smith, who has been director in charge of the Sunshine Mining Co.'s manganese purchasing agency at Phillipsburg, Mont., has returned to Wallace and his original geological position with the Sunshine company. Sunshine operated the Phillipsburg office in the interest of the War Production Board.

L. A. Crozier, who recently returned from India, where he managed a wolfram mine for the Indian Government, is now assistant mine manager of Wattle Gully Gold Mines, N.L., Chewton, Victoria.

J. Price Briscoe, mine operator of Idaho Springs, Calif., has been elected secretary of the local Chamber of Commerce.

Ernest Greenway Jarvis has been appointed chief metallurgist for Continental Industries, Inc., New York City, comprising a group of small and medium-sized industrial plants. Mr. Jarvis is president of Niagara Falls Smelting & Refining Corp. He will take over his duties immediately as advisor and research director to the small business group.

Carl M. Loeb, Jr., vice president of Climax Molybdenum Co., was guest of honor at the annual dinner of the Metals and Minerals Division of the Federation of Jewish Philanthropies in New York City, Nov. 28. His associates paid him tribute for his services to the progress of industry and his years of work for the Federation and other charitable causes.

Leslie E. Dick has resigned as superintendent of the Vermont Copper Co., South Strafford, Vt., and is now production manager for the Amersil Co., Inc., Hillside, N. J. Mr. Dick was formerly assistant superintendent of the Montreal Mining Co., Montreal, Wis.

Alwin C. Eide has been elected vice president of the American Zinc, Lead & Smelting Co. and of its wholly owned subsidiaries American Zinc Sales Co. and American Zinc Oxide Co. His offices will be at Columbus, Ohio.

Frank Hodson, formeral metallurgist to the Board of Economic Warfare and metallurgical representative on the 1943 United States Technical Mission to Brazil, completed his work as technical adviser to the Brazilian government as of Nov. 30 and has taken a position as chief technical adviser to the Institute de Fomento Industrial, Bogota, Colombia, a semi-government organization responsible for new industrial developments in that country. Mr. Hodson expected to leave Brazil for Colombia in December and to visit the United States in January. He can be reached through Instituto de Fomento Industrial, Bogota, or the Chatham Hotel, New York.

OBITUARIES

William Redford, said to have been the first prospector to sink a hole to bedrock in the Klondike, in the 90's, died Oct. 18 in a hospital at Dawson, where he had been a patient several years.

Royden Edward Head, 65, widely known western metallurgist and mineralogist, died Nov. 28 in Salt Lake City. A microscopist with the U.S. Bureau of Mines for 30 years, his specialty was microscopic study of ores, and during his life he published 35 scientific papers in this field.

John C. Pape, 54, died at his home in Phoenix, Ariz., on Nov. 20. He was born in England and was educated at Eton and the Royal School of Mines. During the last war he was a captain in the Royal Air Force.

William C. Rowe, once underground superintendent of the Empire mine of Empire Star Mines Co., Ltd., Grass Valley, Calif., died in Grass Valley on Oct. 29, aged 72.

Guy R. Morely, 34, superintendent of the Twin Peaks quicksilver mine, at Middletown, Lake County, Calif., was killed recently in an automobile accident near Winters, Calif.

Virgil C. Herrin, for more than 30 years an electrical engineer and supervisor of mining properties in Clear Creek County, Colo., for two terms a state senator, and for several terms president of the Mining Association of Clear Creek County, died Dec. 2 in Denver, after a long illness.

Lewis Garwood Rowland, inventor and metallurgist, who thirty years ago developed a magnetic separation method for the treatment of mineral ores, died at Old Greenwich, Conn., on Dec. 2, at the age of 77.

T. R. Buchanan, a mining engineer holding extensive interests in Canada, was killed in an auto accident on Nov. 14 at Elgin Mills, Ont., near Toronto.

Ulysses S. James, metallurgical engineer and inventor of the James ore-concentrating table, died in Orange, N.J., on Nov. 24, at the age of 79.

Cecil M. Ross, a mining engineer known throughout Canada for his achievements in the industry, died in

Montreal on Nov. 29. He was in his 59th year.

Colonel Deneys Reitz, High Commissioner of South Africa since 1942 and who in 1938 was Minister of Mines for that country, died on Oct. 26 last in London at the age of 62.

Joseph Anderson, superintendent of Vindicator mine, near Cripple Creek, Colo., who had been identified with mining in Colorado for 45 years, was killed in an auto accident on Dec. 8. He was 69

Lucien L. Patrick, known as "L. L." to two generations of Nevada miners and the first operator to enlist substantial capital for mining at Goldfield, died on Nov. 25 at his home in Los Angeles.

John G. Easton, of the Victorian Geological Survey, has died at the age of 67 years, after 40 years service as a geologist.

LETTERS

Gold for Russian Purposes

The Editor:

IN THE initial editorial signed by Mr. McGraw in the November issue of the *E.&M.J.*, it is stated and reiterated that the U. S. does not want gold in payment for Russian purchases. I wonder if this indicates that Mr. McGraw is a believer in the managed currency and that he thinks the era of gold is about over. If this is his position, I am sure many of your mining clients will vigorously disagree.

The editorial neglects entirely the function of gold in facilitating the settlement of international balances. It is of course obvious that if there is to be a healthy world economy after the war, the total value of imports into the U. S. must at least equal the total value of exports. This does not mean that every country must send us goods equal in value to those they purchase from us. As Russia is the second greatest source of many of the minerals and other raw materials that we have in such abundance, it is inevitable that we can not take enough of the raw materials to pay for the manufactured goods they will require after the war. However, Russia can export large quantities of many of its raw materials to less favored countries that will need them, and those countries may export to us finished products that we may need more than Russia's raw materials. We could pay for these finished products with the gold that Russia sends us in part payment for the machinery we ship to them.

Unless there is perfect confidence in all the paper currencies, which seems exceedingly unlikely in view of the great inflation that is taking place almost everywhere, gold will in this way be of the greatest value in stabilizing exchange values.

Even the great gold reserves that we have at present are serving a most useful purpose. You have no doubt noticed that in the past year and a half the gold reserve of the U. S. Treasury has decreased by around two and a half billion dollars, or nearly 12 percent. This means that foreign countries and individuals that are supplying to us materials needed for war use have more confidence in gold than they have even in the dollar. If we had not been in a position to pay in gold when this was demanded, we should have been forced to pay higher prices to foreign countries and individuals for the materials we imported from them. Our gold supply has therefore filled its more useful function in increasing the confidence of the world in our currency and in preventing excessive inflation.

I am sure your subscribers would be interested to know if Mr. McGraw agrees with Lord Keynes that the use of gold is a relic of barbarism.

IRA B. JORALEMON

(The statement referred to was not intended to indicate any views with reference to hard money versus managed currency, but to suggest that we cannot expect to support international trade on gold transfers alone. There is not enough gold existent or produced outside our borders to finance our export trade. Also, this country is so large a factor in world trade that if we refuse to take goods in payment for exports some other nations will find it difficult to provide payment. Furthermore, to concentrate most of the world's gold in the hands of one nation is detrimental to the re-establishment of the gold standard. Lacking gold, other nations will constantly seek the means of doing without it.—The editors.)

Electrolytic Manganese in Important Supply

The Editor:

THE ARTICLE in your October issue entitled "Manganese Metal Ready for Large-Scale Production" might leave in the reader's mind the impression that electrolytic manganese is in short supply. The contrary is true; there is now being currently made substantial quantities of this metal, and large stockpiles now exist, from which any sudden surge in demand could be met. These stockpiles amount in quantity to about one million pounds.

The plant of the Electro Manganese Corporation at Knoxville, Tenn., which is the principal producer, commenced operations in 1939. Production since then has been:

Year	Production Total, Lb.
1939	43,669
1940	418,837
1941	1,190,042
1942	1,306,310
1943	2,385,486
1944 (10 months)	2,752,910
Total	8,097,254

Production is stable and continuous, at the rate of about 275,000 lb. per month.

Of the production total shown, about one and one-half million pounds were produced prior to the commencement of the Bureau of Mines pilot plant in November of 1941. The processes used in this pilot plant and in our commercial plant are quite dissimilar, as might be expected from the nature of the objectives to which each was directed. In our case we had to make metal commercially, and in ever-increasing quantities, to satisfy a war-stimulated demand. In the case of the Bureau's plant, the objective was to work out a method for utilizing during periods of national emergency a number of domestic deposits of manganese ores. These deposits are much lower in manganese than the imported ores. Domestic ores, in our extensive experience, are likely to be high in certain impurities which, even in minute concentration, tend greatly to complicate the electrowinning of the metal.

The question of scale of operation in a metallurgical process is a relative matter, having regard for the length of time the particular branch of the art has been in existence, and also the value of the output. Thus considered, the electrolytic manganese industry, which has been in existence only four years, has made a not inconsiderable showing. Indeed, measured by the yardstick of value of product, the current output at Knoxville is about equal to that of a 25-ton a day electrolytic zinc plant.

The rate of expansion in the electrolytic manganese industry will undoubtedly be proportional to the rate of reduction in costs. Volume of sales is sensitive to price, which is natural in that the metal at its introduction was not new to industry, as was, for instance, molybdenum, but merely a purer form of a long established alloying and purifying material, and thus has to make its way against competition.

Unfortunately, upon analysis of our cost sheet we have found that those items that cannot be expected to vary with increased scale of operation, such as ore, reagents, and kilowatt-hours per pound of cathode metal, constitute a relatively large portion of the total unit cost of the metal.

Of the remaining items, the many refinements that suggest themselves are of a nature such that much detailed research work and pilot-plant testing must precede their incorporation in a new plant design.

At our plant, however, there does exist a large part of the necessary equipment, including generator capacity for an expansion in production of 50 percent, and this expansion will be made as soon as certain critical materials become available. It is probable that the resultant volume of production will take care of the developing demands for the metal for a considerable period of time.

The electrolytic manganese process is relatively expensive and complex; in operation it is extremely sensitive. In the contemplation of a large-scale expansion program, it is perhaps well to bear in mind the adage of "the more haste the less speed."

R. H. BENNETT, Chairman
Electro Manganese Corporation,
Minneapolis, Minn.

REGIONAL NEWS

CALIFORNIA

Gold producers preparing for resumption of operations as soon as L-208 is cancelled

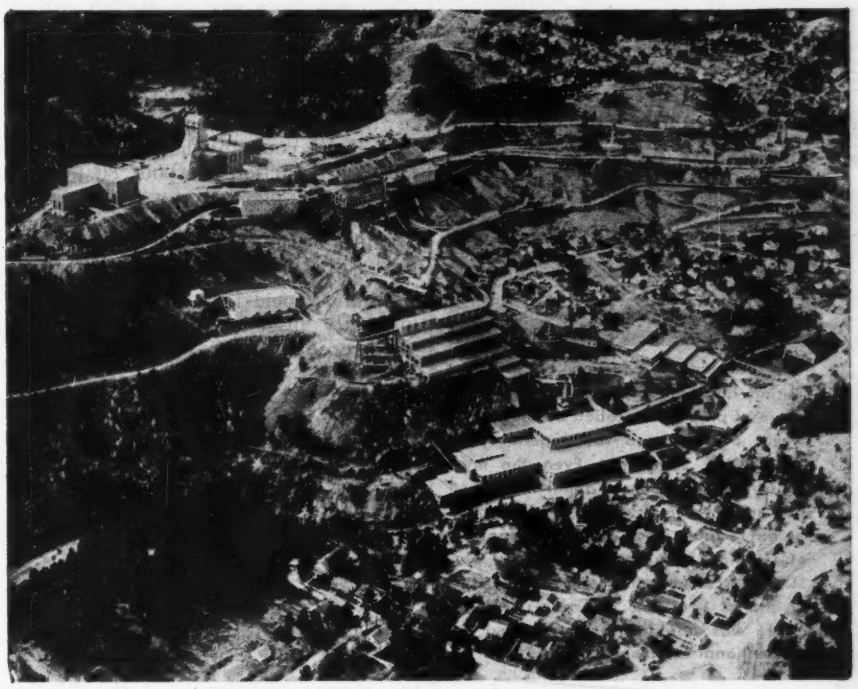
★Western Empire Mining Co., Inc., A. L. Mecham, president and general manager, Santa Barbara, Calif., has taken over the old Castac gold mine, in Ventura County, at one time leased to mining interests of Torrance, Calif., by Castac Mining Co., the owners. Road construction has been started in preparation for resumption of gold mining immediately after cancellation of L-208 and when equipment is available for erection of a 50-ton milling plant. The Castac property produced gold in the early days before California acquired statehood, and recent operations are said to have produced several hundred thousand dollars in free-milling ore. Western Empire Mining until recently produced chrome and manganese from holdings in Trinity County.

★A subcommittee of the San Francisco Chamber of Commerce mining committee is studying a proposal to establish a minerals industry building in San Francisco to house all governmental agencies serving the mining industry. Under the proposal the building would accommodate the State Division of Mines with its library and museum, State Division of Oil and Gas, and offices of the U. S. Bureau of Mines and U. S. Geological Survey.

★A new treatment plant is scheduled to be erected soon at the property of Pacific Pyrophyllite Division of Huntley Mines near Big Pine, Mono County, where stripping and road work to open up a new pyrophyllite deposit have been in progress for some time. The mill to be built is designed to handle both pyrophyllite and talc. Mining will be carried on by open pit methods. W. H. Huntley heads Huntley Mines, which currently produces talc, and also holds the Mono Lake copper mine, and the Virginia Lakes and Laurel Lakes zinc mines. C. E. Demorest, Big Pine, is manager-secretary.

★A small crew of miners is at work at the old Tellurium mine, near Pine Grove, Amador County, operated by Charles Brockman and Dr. Frank O'Neill, of Jackson and Oroville, respectively. The property is developed by a 1,400-ft. tunnel and two shafts, and available ore contains gold with small values in silver and lead.

★Limited mining operations pending full production as soon as the ban on gold mining has been lifted are in progress in the Hornitos gold mining area of Mariposa County. Unwatering of the Iron Duke mine is progressing satisfactorily, and rehabilitation and development work is under way at the Red Cloud and Nellie Kayo properties. The Iron Duke is operated by Grover Kihorney, of Glendale, Calif., and the Red Cloud by R. A. Fredericks and associates. The Nellie Kayo was leased and optioned recently by the Ruth-Bobby Mining Co. a limited partnership controlled by L. R. Lurie and F. Kahn, of San Francisco, with operations directed by W. B. Brule, general manager.



AIR VIEW of surface plant of Homestake Mining Co., Lead, S. D., premier gold producer of the United States, still inactive under WPB Order L-208. Photo by Black Hills Studios, Inc., Lead, S. D.

★Preparations to conduct operations during the winter months have been completed at the Mugwump mine at Forest, Sierra County, by the operators, C. E. Thompson and Eric Enlund. The property was reopened by Mr. Enlund about a year ago, with activities centered in exploration of a quartz vein encountered 1,700 ft. from portal of tunnel driven on gravel channel.

★The Siskiyou County Minerals Association has been organized at Yreka, representing several hundred miners and mine owners in the county. The purpose of the organization is to promote the best interests of mining in the county, and to work for needed legislation, both local and national. The new association takes the place of the old Klamath River Mining Association. Kenneth Ash was named chairman of the temporary board of directors to incorporate the organization and draft bylaws. Other members elected were: George Milne, Fort Jones; Mrs. Dorothea Reddy Moroney, Yreka; Bill Tolman, Happy Camp; and Burton J. Westman, consulting geologist, Yreka.

★Diamond drilling is under way at the Quail Hill mine, near Angels Camp, and on claims in the Copperopolis district controlled by William Hutcheson. Ores containing copper, gold, silver, and zinc are reported to have been disclosed on both properties. Roy L. Kirk is directing work on the Copperopolis claims, where two shifts of miners are at work.

IDAHO

Good 1944 dividend and safety record—Mine-to-market roads to be No. 1 postwar project

★During 1944 the Federal Mining & Smelting Co.'s big Morning mine, at Mullan, which normally produces more than 1,000 tons per day, was practically closed on account of an acute manpower shortage. No official statement has been made by the company, but it is believed the Page mining operation near Kellogg has been the major factor

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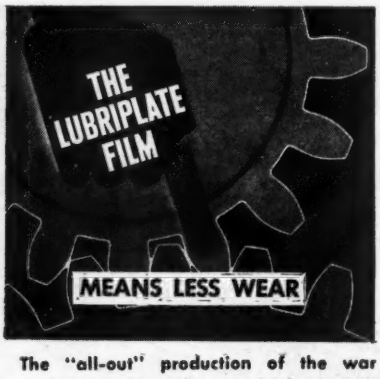

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Idaho (*continued*)

in the company's production record. Lead-zinc orebodies of major importance have been discovered and developed at the Page within the past year.

★The Silver Cable zinc-lead property, about six miles east of Mullan, which is being operated under lease to the Hecla Mining Co., has been closed for the winter because of snow conditions at the mine, which is at the top of the Bitter Root range of mountains. The Hecla company has maintained a steady production of about 80 tons of Silver Cable ore daily for the past two years, trucking the material about 17 miles to the company's mill at Gem, in the Burke Canyon out of Wallace.

★Mining operations have been permanently discontinued at the Unity Gold Production Co.'s property near Warren, according to A. C. E. Hamilton, manager, and all the mining and plant equipment is being dismantled and sold.

★The latest zinc-lead ore development in the Hailey district, in central Idaho, is the "Snoose" property, near the Triumph mine. It is owned by A. M. Jensen and Harry Stevens, general superintendent and assistant superintendent of the Triumph operations. Three carloads of high-grade ore are reported to have been shipped from the surface prospecting of the Snoose property.

★The Coeur d'Alene mining district paid a total of $4,306,722 in dividend profits to stockholders in 1944, against $4,547,029 for 1943. The shortage of $240,307 between the two years was caused by lack of manpower and not by a reduction in tonnage available. As a matter of fact, production of the district would have been greater than for any other year had manpower been available, for the reason that several new companies joined the list of steady producers.

Three big companies, Bunker Hill, Sunshine and Tamarack & Custer, reduced their dividend payments because of unfavorable labor conditions, and three new companies, Polaris, Highland-Surprise, and Silver Dollar, joined the list of dividend payers.

Following is the list of dividend paying mines of the district, their recorded payments for 1944 and 1943 and their total dividend disbursements:

Total dividend record of the district is $193,209.104, including producers which have suspended operations.

★Mine-to-market roads have been selected as a No. 1 postwar project by the Chambers of Commerce of Wallace and Kellogg. Rebuilding of about 9½ miles of road up Pine Creek west of Kellogg at an estimated cost of $200,000 will be the first improvement undertaken after the war. Newly opened mines in the Pine Creek area are now shipping approximately 500 tons of zinc-lead concentrates daily to the Sullivan zinc plant at Kellogg, and this production will be increased if present zinc prices continue. Second road project recommended is the 2¼-mile road to the Federal company's Page mine, at the mouth of Pine Creek, at an estimated cost of $42,000. Other road projects contemplated include improvement of the road up Nine Mile Canyon north of Wallace to serve major producing zinc-lead mines in that area and the road up Placer Creek to Avery, on the main line of the Milwaukee, south of Wallace.

★The Boaz gold mine property, at Norris, Mont., has permanently suspended operations, according to report, because of unprofitable gold values and increased water flow in the lower workings of the mine. The property is owned by Shirley D. Parker, of Beverly Hills, Calif., and Arthur J. Theis, who has been manager, and has produced in the ten years of its operation under present ownership close to $2,000,000 in gold. The mine is equipped with a modern 50-ton cyanide plant which will be kept intact pending the development of what is known as the "Peanut" vein, adjoining the Boaz. Mr. Theis is now engaged in the development of a quicksilver property near Darwin, Calif.

★State Mine Inspector Arthur Campbell states that the year 1944 established the best safety mining record in the history of the state, showing only three fatal mine accidents, compared with a usual annual total of about 18. The total number of men employed in the industry has been much smaller than in normal years and more inexperienced men were included.

★Bunker Hill & Sullivan announces opening of its solarium treatment plant for workmen, under the management of Mrs. Grace Dettinger. The treatment is available to employees

Dividend Record, Coeur d'Alene District Mines

	1944	1943	Grand Total
Bunker Hill & Sullivan	$654,000	$1,308,000	$59,241.241
Caledonia		71,627	4,923,129
Clayton Silver Mines, Clayton, Idaho	90,000	90,000	285,000
Coeur d'Alene Mines Corp.			550,057
Dayrock		34,943	341,497
Federal M. & S. Co.	863,240	863,240	30,240,880
Hecla Mining Co.	1,000,000	1,000,000	28,155,000
Highland-Surprise	123,704		123,704
Jack Waite			41,316
Polaris	600,000		940,000
Sherman	110,250	110,250	259,350
Silver Dollar	20,000		20,000
Sunshine Mining Co.	595,528	668,969	24,535,771
Sidney Mining Co.			108,750
Sullivan Mining Co.			174,482
Tamarack & Custer	250,000	400,000	2,642,123
	$4,306,722	$4,547,029	$152,158,230

who make arrangements for it and is available to the public and school children on certain days of each week. The sun treatment provided is said to be very popular and beneficial.

★The latest operation for recovery of tailings from the Coeur d'Alene River is by the workmen at the Golconda mill, who joined together and secured a lease on the river property just below the Hecla sink-float mill at Osburne. (*E.&M.J.* May, 1944). They employed a power shovel and operator and started digging up the old river channel, finding a deposit of pay gravel several inches thick on the bottom, after removing a shallow overburden of gravel and boulders from the top. The pay gravel contains 3½ percent lead, 3½ percent zinc, and 2 oz. in silver per ton, and it costs the leasers $1 per ton for "mining" and $1.50 per ton for milling. They have shipped several cars of concentrates containing 60 percent lead and 30 oz. of silver per ton and several carlots containing 50 percent zinc.

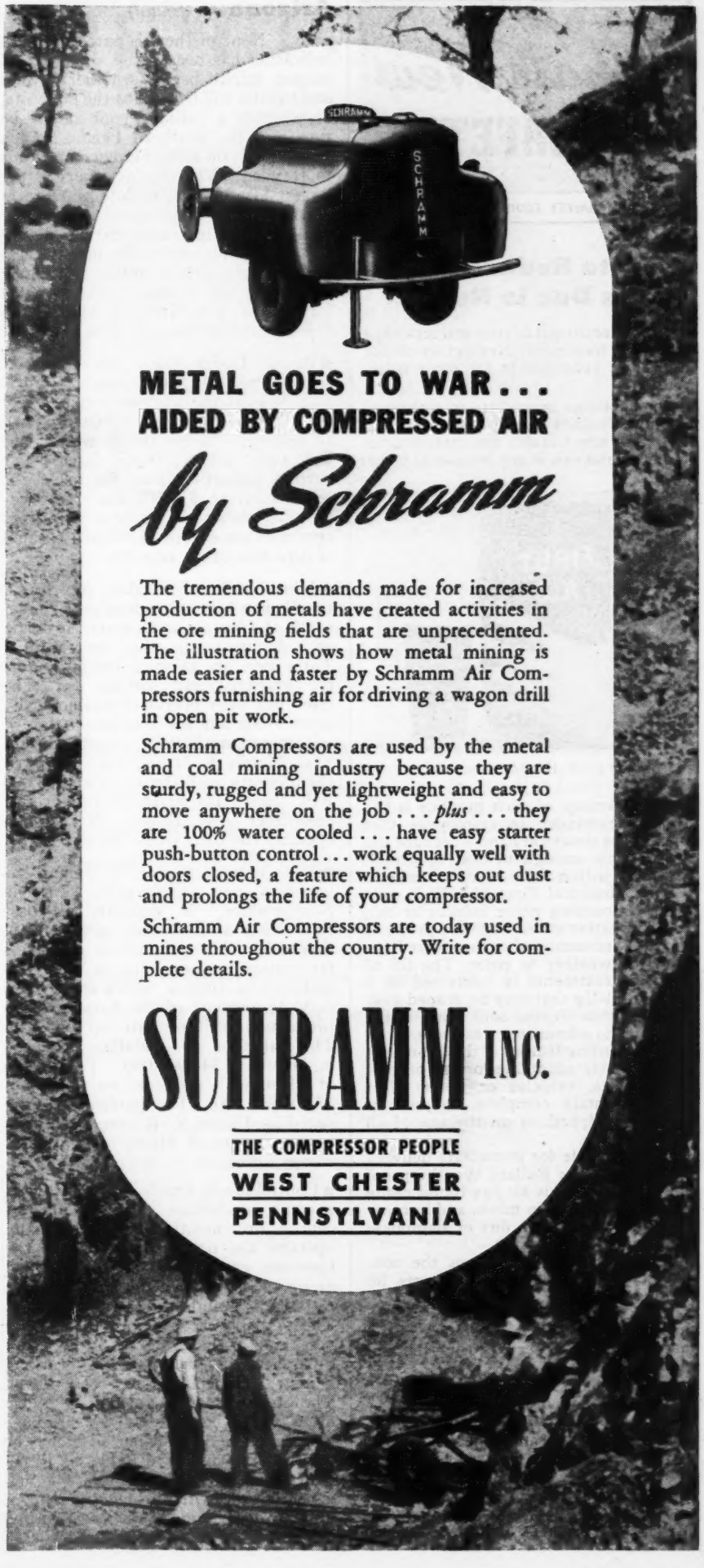
★Miners employed at the Triumph mining property near Hailey, numbering about 150 men, have petitioned the War Labor Board for a rise in pay amounting to 51c. a shift. The company is operating the largest zinc-lead mine in Idaho outside of the Coeur d'Alene district and is producing about 300 tons per day of gold-silver-zinc-lead ore. The property is equipped with a 500-ton milling plant.

★The Hayden Hill Mining Co. has acquired title to the Purim, Herschey, and New Hope mining claims in the Evolution district of the Coeur d'Alenes, said to be in conflict with claims owned by the Lincoln Mining Co. The decision awarding title to Hayden Hill was handed down by District Judge Bert Reed, of Coeur d'Alene City. The property in question is under long-term lease to the Silver Dollar Mining Co., which owns a highly productive segment of the Chester vein.

ARIZONA

Magma takes option on new copper deposit — Springfield mine to sink another 100 feet

★Discovery of an important new copper deposit in Arizona, 46 miles northwest of Tucson and lying between Oracle and Mammoth near Tiger, has been made known by Magma Copper Co., of Superior. The company has taken a purchase-option on the property and will begin churn drilling exploration at once. The property, known as the San Manuel, contains a large tonnage of ore on the basis of explorations made by Bureau of Mines and the Geological Survey under direction of WPB. The limits of the deposit have not yet been determined. Additional claims have been located by the com-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What's New IN SAFETY

NEWS ABOUT SAFETY EQUIPMENT AND METHODS

How to Reduce Infections Due to Neglect

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The mounting feature of this kit makes it particularly adaptable for use on tool sheds, poles, vehicles or boats. Unit packets contain complete, easy-to-understand instructions on the use of all first aid items.

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EVERYTHING BULLARD IN SAFETY

Arizona (*continued*)

pany. None of them is patented. No indication has been given when actual mining might begin, whether a mill and smelter will be built at the mine site, or whether a railroad spur might be run from the Southern Pacific branch which takes off from Florence and runs to Hayden. The new discovery is the largest located in a decade or more in Arizona, where mines have been severely depleted by intensive operations during the war. The four claim holders who granted the purchase-option to Magma are Henry W. Nichols, chief chemist for Magma; J. B. Griffin, J. M. Douglas and Victor Erickson, all of Superior.

★Phelps Dodge Corp. has filed suit against the State Tax Commission for a reduction in the assessed valuation of the company's United Verde property at Jerome. Phelps Dodge won a suit last year on the same issue. The current valuation was fixed by the commission at $11,500,000. The corporation claims the value of the property does not exceed $5,092,884 because of depletion of ore reserves.

★John Nezik, of Cleator, has leased the French Lily mine, located 11 miles south of Cleator, and expects to begin ore shipments in the near future. Three men are at work reconditioning the property and sorting ore. The mine has been operated spasmodically since 1900, but the last production of importance was in 1936, when the Southwest Metals & Mines, Inc., operated the property with the aid of an $85,000 RFC loan. The mine is a producer of gold-silver and copper. Nezik also operates the Grey Goose mine, near by.

★The Arizona Bureau of Mines has issued a new publication, "Arizona Nonmetallics," a summary of past production and present operations in this field. The production of metals far outstrips the value of the nonmetallics in Arizona, which amounts to only 1⅓ percent of the total mineral production of the State up to 1944. The value of non-metallics produced in Arizona is $48,000,000. Total value of all minerals produced up to 1944 is $3,500,000,000. The publication, prepared by Eldred R. Wilson, is No. 152 in the Bureau of Mines mineral technology series.

★Control mines, Oracle, has reported an average production of 1,500 tons of copper ore monthly. The company operates the properties known as the Gesemen group and the Leatherwood group of claims, located in the Santa Catalina Mountains, Pima County. The property is developed through an adit and a shaft 300 ft. deep, with drifts at four levels. Present working is now confined to the second level. The orebodies, with an average width of 15 ft., are being mined by shrinkage stoping. Ore is transported from the mine to the mill, a distance of three-quarters of a mile, by truck. The mill is equipped with a Denver Sub-A flotation cell, and power is generated by a 120-hp. Fairbanks-Morse diesel. The mill is operating two shifts per day and is producing over 100 tons of concentrates per month, which are trucked to the Hayden smelter. Copper is the only valuable metal, as there is no gold and very little silver in the ore. Robert I. MacKay, Jr. is superintendent.

★P. R. Helm and associates, owners of the Springfield mine, 2½ miles west of Crown King, have received authorization from RFC engineers to sink another 100 ft. on their ore. Operating on a Class "B" $25,000 RFC loan, the operators are shipping one carload of ore per week, all the smelter will handle. The chief value is in copper, assaying approximately 12 percent. Some gold-silver-lead and zinc are also mined. Five men are employed at the present time. The mine is a "chimney" type deposit of sulphides.

★Capacity production is expected soon by operators of the Tungsten Reef mine, in the Huachuca Mountains, 36 miles west of Bisbee. The property, which has been operated since 1934, consisting of nine patented and five unpatented claims, is owned by J. J. Seeman, of Hereford. Several men are at work, overhauling the mill and equipment. From 5 to 18 tons of concentrates are usually shipped at a time, assaying from 70 to 74 percent WO_3. Labor shortage is given as the reason for curtailment of production. The scheelite-bearing quartz vein covers most of the patented claims, and part of it on the surface is mined by open cuts.

★Early in December fire of unknown origin destroyed the plant of the Rare Metals Electronics Corp. three miles south of Kingman. Valuable equipment was completely destroyed, and the loss is estimated in excess of $30,000. Citizens of Kingman were interested in the project.

★The Kaibab mine, at Jacob Lake, Ariz., approximately 40 miles south of Kanab, Utah, owned and operated by Atherley & Ryan, is producing 115 tons of ore per day running 7 percent copper and 70 percent silica, the silica content making the ore desirable as flux. The operation is open pit, with the bed of ore varying from 6 to 17 ft. in thickness. Although deposits in that area have been worked spasmodically for years, it is only within the last few months that operations, encouraged by premiums, have become extensive. All ore is delivered to Marysvale, Utah, by truck, a haul of 165 miles. The ore then is hauled by rail to Garfield, Utah.

NEVADA

Basic Magnesium plant to be used for rocket and shell production—Diamond drilling in Goldfield district

★Following the closing on Nov. 15 of the $130,000,000 plant of Basic Magnesium Inc., at Henderson, after having

produced 165,000,000 lb. of magnesium, or 25 per cent of the total used by the Allies, it was announced that a large part of the plant will be acquired by the Rheem Manufacturing Co. for manufacture of rocket projectiles for the Navy and 81-mm mortar shells for the Army. W. E. Curran, Rheem Co. vice president in charge of manufacture, who arrived by plane from New York with engineers, said that by agreement with the Defense Plant Corp. his company had taken over a substantial section of the BMI plant, that some $3,000,000 worth of machine tools and equipment will be supplied by the Navy and Army for their contracts, that full-scale production by March 1 was expected, and negotiations were under way by the Rheem group to secure additional buildings in which to produce other war materials. Under the plan, magnesium metal units are to be maintained in standby condition.

★Consolidated Coppermines Corp. on Dec. 20 paid dividend No. 18 at the rate of 10c. per share. Production of around 9,000 tons per day is largely from the new open cut on the Tonopah claim, supplemented by underground ore from the Morris Brooks mine. Cassius I. Cook is manager at Kimberly.

★Development work is being conducted on a substantial scale by the U. S. Smelting, Refining & Mining Co. on the Mountain View zinc property, in the Lone Mountain district, western Eureka County. The old mine was taken under lease and option from two Eureka miners. W. Frank Walthall, of Eureka, is in charge.

★Prospect drilling in the northern part of the Goldfield district, where two diamond drills have been operating at widely separate points, is conducted by the New Verde Mining Co., wholly-owned subsidiary of Newmont Mining Corp., according to Esmeralda County records. Drilling at first in the flat area north of the site of the long-dismantled Goldfield Cons. Mines Co. mill, one of the drills was moved recently to a point on the Sandstorm mine, on the north flank of Columbia Mountain, first location to be recorded at Goldfield.

★Shipments of copper ore containing some gold and silver have been going at the rate of a carload weekly to the Garfield smelter, in Utah, from the O'Leary & Troester lease on the Copper Queen mine, near Copper Basin, six miles south of Battle Mountain. The mine, an early-day producer, was reconditioned and worked for some months a year ago by the Eureka Central Mining Co.

★Deep diamond drilling on property of the Mountain City Cons. Copper Co. in northern Elko County by the Mitchell Diamond Drill Co., of San Francisco, has been halted by inability to keep the 3,000-ft. water line from freezing at the 6,500-ft. altitude, although the pipe was drained nightly. A drill of different type is being provided, with which a 1,000-ft. hole will be drilled at a 45-deg. incline from the shaft station in the 250-ft. tunnel. The inside shaft sup-

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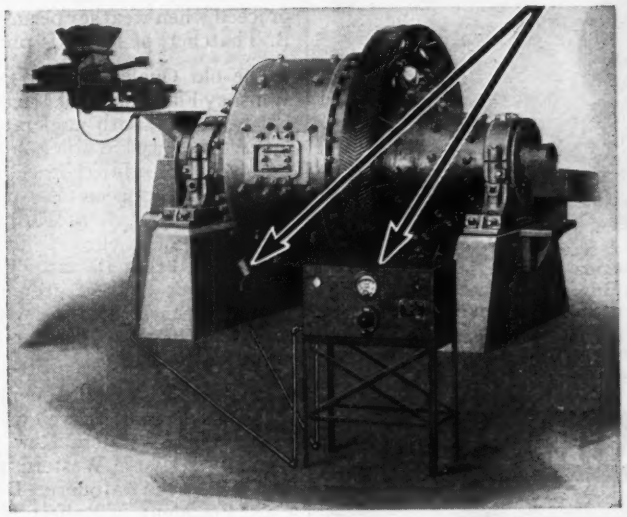

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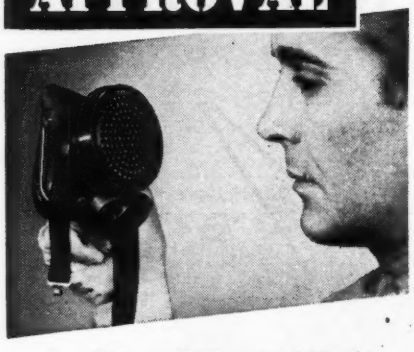

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Nevada (*continued*)

plies abundant water, and a Caterpillar diesel plant at the adit portal will provide adequate power. Surface drilling and sinking of a main deep shaft will proceed when weather permits. George B. Thatcher, of Reno, is president.

★The old Qualey copper mine, in the Whiskey Flat district of Mineral County, has been sold, with moderate cash payment, by Hy Werner and Gunnar Peterson, of Hawthorne, to Charles Peake and associates, of southern California, who are preparing to extend old workings, opened by the late Governor Fred Balzar. Peterson, in recent work in new ground, reported having opened a 3-ft. width of ore sampling up to 10 percent copper and 50 oz. silver.

★Planning a Nevada operation at an unspecified point, as well as projects in other mining states, New York men formerly active in Western mining have organized the Modern Development Co. President is Robert H. Malcolm, former head of the Montizona Copper Co., which for some years operated copper property south of Casa Grande, Ariz. Other directors include John Carroll, Chester W. Church, James Otis Rodgers, and D. H. McCluskey, all of New York. Stanley F. O'Leary, of Battle Mountain, has been retained as consultant in Nevada.

★Destroyed by fire in mid-October, the power plant at the Fad shaft of the Eureka Corp. Ltd., operating under lease the formerly productive lead-zinc silver mines of the Richmond-Eureka Mines Co., on Ruby Hill near Eureka, is to be rebuilt at once. William Sharp, managing engineer, had sunk the four-compartment shaft about 600 ft. when the fire halted work. Drilling by the U. S. Bureau of Mines from the 900-ft. level of the old main shaft is said to have entered ore of high grade in one of two holes.

★Processed fluorspar produced by J. I. Crowell, Jr., of Beatty, southern Nye County, from his Daisy mine and small plant near that point, is trucked in considerable volume 75 miles to Las Vegas for rail shipment to Pacific Coast plants. The deposit, on Bare Mountain, is of great magnitude and high purity.

★At Goodsprings, Clark County, the U. S. Bureau of Mines has completed an extensive drilling project on the Yellow Pine mine, notable lead-zinc producer during the first World War and now operated by the Coronado Copper & Zinc Co., headed by Philip Wiseman and Harvey S. Mudd, of Los Angeles. Within the past year the mine has supplied the bulk of oxidized lead-zinc ore forming a 40,000-ton stockpile at nearby Jean, on the U. P. railroad. Roy W. Moore is directing engineer.

★A 50-ton concentrator was reported treating lead-zinc ore of the old Keystone mine, in the Central district of northern Pershing County. The mine was reopened in 1940 by Raymond Brooks, in association with Reuben and H. A. Jones, of Winnemucca, the Jones brothers still working the mine.

★Production of pinite, hydrous silicate of aluminum and potassium, will continue as long as roads remain open from a deposit of rare quality in the Humboldt range in central Pershing County. The product is mined and shipped to the Pacific Coast by Gladding, McBean & Co., of San Francisco, for manufacture of high-resistance refractories.

★Price ceilings for the first time have been imposed on crude talc mined in the productive Palmetto district, western Esmeralda County, trucked to California points and checked at Zurich, Calif. OPA ceilings range from $15.25 for No. 1 selected cosmetic talc down to $8 per short ton for No. 4 filled or blue talc. One producing company is driving a 1,000-ft. tunnel.

★Mill employees of the Combined Metals Reduction Co. at Pioche have received their third safety award for another 60-day period without a lost-time accident. Since a management-employee safety program was adopted in 1940, a progressive decline has been noted in accident frequency and severity.

★Drilling of scheelite deposits is soon to be undertaken by the U. S. Bureau of Mines on the Alpine tungsten property in the Potosi district in Humboldt County, near the Getchell and Riley tungsten groups. The Alpine is owned by Stanley F. O'Leary, mining engineer of Battle Mountain.

UTAH

Metal-mine safety regulations to be revised by joint committee representing industry and state industrial body

★Utah's general metal-mine safety regulations will be revised through joint action of the industry and R. D. Dalrymple, head of the mine safety division of the State Industrial Commission. The industry's committee is composed of O. A. Glaeser, U.S. Smelting, Refining & Mining Co.; M. D. Paine, Tintic Standard Mining Co.; and B. L. Sackett, International Smelting & Refining Co.

★The U.S. District Court at Salt Lake City ruled in favor of the Reconstruction Finance Corp. Nov. 8 in a suit filed by Aluminum, Inc. (Marysvale, Utah), against RFC. The suit had been filed when an RFC loan of $775,000 was canceled. The plaintiff sued for $1,250,000, claiming $475,000 damages. RFC previously obtained judgment for an original loan of $50,000, plus $10,000 advanced on the second loan. The plaintiff is not connected with Kalunite, Inc., Salt Lake City, operators of a Defense Plant Corp. alunite-alumina plant.

★Utah Copper Co., which produces 27 to 30 percent of the nation's domestic copper—also substantial quantities of

gold and molybdenum—has been in the limelight in recent weeks. For many years the largest taxpayer in the State of Utah, the company on Nov. 18 paid $1,945,859 in property and net proceeds tax, which was the largest payment of its kind ever made by the company. This exceeded the 1943 payment by $200,000. With the addition of $1,316,700 in franchise, sales, and use taxes, as well as unemployment insurance taxes, the company's total contribution to the State and local government and school system was approximately $3,250,000 for the year.

★New York City officials of Kennecott Copper Corp., owner of Utah Copper Co., met with the operating staffs of the Ray, Chino, and Nevada mines divisions of the company and of the Utah Copper Co. on Nov. 27–29, in Salt Lake City, to discuss current operating problems. R. C. Klugescheid, New York City, vice president, said mining and milling of copper will be continued at highest possible production levels with available manpower for the period of heavy war demand. Kennecott is not operating any submarginal mines dependent on federal premiums. "Until we know how much copper will be stockpiled and how heavy civilian demand will be, we will be unable to determine what our peacetime production will be," he said.

★Following a hearing conducted Nov. 21 in Salt Lake City, a special panel appointed by President Roosevelt announced a report favoring the Bingham & Garfield railway in a dispute with the Brotherhood of Locomotive Firemen and Enginemen. The brotherhood contended that the railway should employ a helper on each small electric locomotive engaged in switching operations in the yards at Bingham, Magna, and Arthur. They said the railway was obligated to this because it had agreed with the brotherhood May 22, 1941, to the wage scale to any agreement entered into by the brotherhood with the Denver & Rio Grande Western Railroad, and that a subsequent national wage agreement provided for employment of a helper on each locomotive of a weight as low as those employed in the switching operations.

The railway's case, presented largely through testimony of Mr. Haymond, vice president and general manager, was to the effect that a second man in the cab would have no useful work to do; that safety did not require the additional employee for such switching work because maximum speed is about 12 miles per hour; that the company has placed the extra man as a safety precaution in cabs of diesel locomotives operating outside of company yards; that to employ an extra man would be a waste of manpower when the mining company has been forced to curtail operations by more than 30 percent because of a shortage of help at both the mine and the mills, and that the company is not a party to the general agreement with the brotherhood specifying employment of such helper.

A fourth occurrence involving Utah Copper, followed announcement of the

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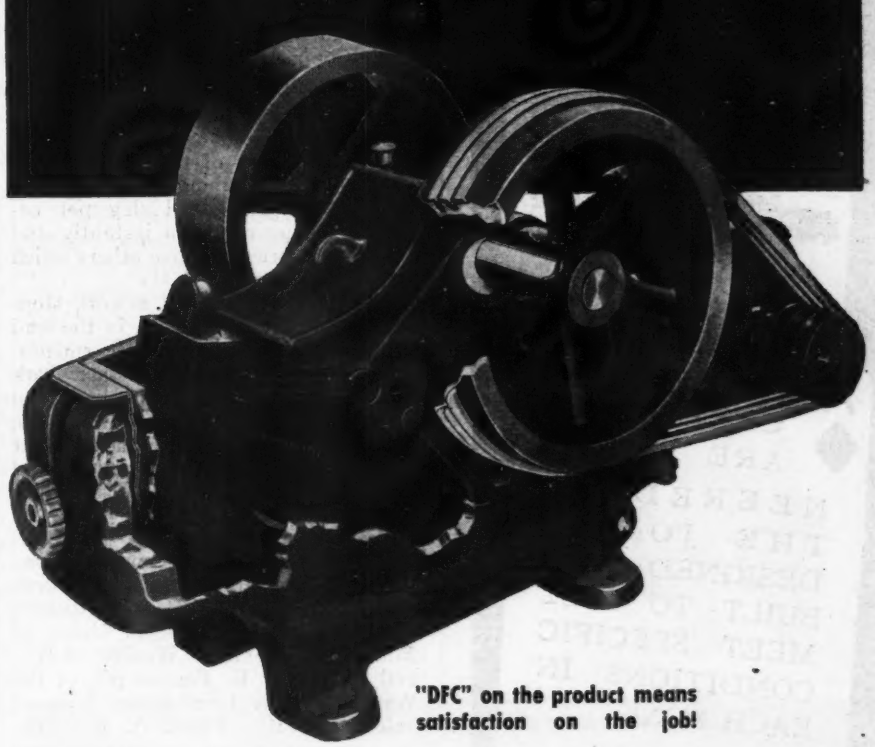

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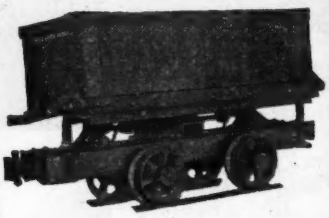

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Utah *(continued)*

panel's decision. This was a slide of thousands of tons of overburden dumped in Markham Gulch below the company's big open-cut copper mine in Bingham Canyon. On Dec. 9 waste from near the top of the big dump began to slide downward. The small avalanche extended down the gulch more than 600 ft. and in places reached a depth of seven feet. This damaged seven homes owned by the company and imprisoned two children in one of the houses. Neither was injured seriously.

Officials of the railway did not determine immediately if a large steel bridge which spanned the gulch had been injured by the slide, but rerouted ore shipments to bypass the bridge. Louis Buchman, general superintendent of Utah Copper Co. mines, said it would take more than a week to clear debris.

★An accident with more tragic consequences occurred Nov. 29 at the lead and zinc division of the International Smelting & Refining Co.'s Tooele smelter. A giant steel slag pot exploded, killing one man instantly and inflicting injuries on three others which caused their deaths.

This tragedy followed a work stoppage, Nov. 27, 28, and 29, in the lead and zinc division of the Tooele smelter. One hundred employees left their work because W. S. Sparks, who had been employed at the smelter seven months, publicly expressed determination that he would never join the union, and reportedly became obnoxious in his diatribes against unionism and the Roosevelt administration. The employes returned to work Nov. 29 following a meeting addressed by J. Frank Marble, president-secretary of district union No. 2, International Union of Mine, Mill & Smelter Workers (CIO), and by Birney K. Farnsworth, of the War Manpower Commission, both of Salt Lake City. Frank A. Wardlaw, Jr., company general manager, pointed out that the company's contract with employees calls for maintenance of union membership. He estimated that there are only 10 to 15 non-union employes at the smelter and praised the union officers for stepping in and ironing out the trouble. Mr. Marble expressed appreciation of cooperation by the company and said he understood Mr. Sparks would be asked to be more discreet in utterances against the union. Mr. Sparks resigned from his employment Nov. 29, saying his discussions about not joining the union had been friendly until fellow workers began stopping him to say he would be sorry if he didn't join.

★Silver King Coalition Mines Co., Park City, reported third-quarter net profit of $112,958, after all charges except depletion, and net profit of $28,747 for the year ended Sept. 30, 1944.

★The University of Utah department of geology has issued a new bibliography of the geology and mineral resources of Utah, bringing references to articles and authors up to date through Dec. 31, 1942.

COLORADO

Fluorspar processers active in five districts—Reduced war demand closes mica trimming plant

★Fluorspar processers in Colorado are proceeding apace with development plans, concentrating on the higher, or acid grade, fluorspar in order to be in a better position to compete with mid-Western production after the war.

In effect, a fifth Colorado fluorspar district is being opened up near Colorado Springs by Kramer Mining Co., whose comparatively new mill at Brown's Canyon near Salida was destroyed by fire last summer. According to Raymond V. Kramer, president, the company's new mill just outside Colorado Springs will be in operation about Jan. 1. It is of steel and concrete, will use some of the equipment salvaged from the Brown's Canyon fire, and will have a capacity of 50 to 60 tons daily of acid-grade fluorspar, or 100 to 150 tons of the crude ore. It is being built by the company itself. An extra bank of flotation cells will be added to extract gold, silver, lead, and zinc, which are not present at Brown's Canyon. Mr. Kramer says indications are these values will run $3 to $4 a ton. The mines from which the mill will be fed are three, all on the same vein but at slightly different localities. The first mine is an open pit from which 120 tons of ore daily is being taken for stock-piling at the mill, so a stock of 5,000 tons is expected to be built up by January. The second and third are tunnels, one an old tunnel driven 600 ft. into the mountain for gold in the 90's, the other new, about one and one-half miles away. The first mine is on the Gorley Mountain Highway, the second and third on State Highway 122, all southwest of Colorado Springs and between 13 and 14 miles from the new mill. Mr. Kramer said there is enough ore in sight at the tunnel operations, above tunnel level, to run the mill for 60 years and the company hopes to expand within two years.

At Northgate, in North Park, fluorspar deposits are owned respectively by Kramer Mines and by Western Fluorspar Co. The Bureau of Mines is doing some exploration work by tunneling having found that the ground is too soft to hold cores. Kramer is not active. Western Fluorspar Co. is operating a heavy-media sink-float mill with a capacity of 600 tons of ore daily, to produce metallurgical grade fluorspar. It has discussed installing a flotation mill to make acid-grade fluorspar from the sink-float tailings, but so far no concrete plans have been made. Buildings at this property, erected by the government for fluorspar production, have been declared surplus and will be put up for sale when the war emergency is past.

Near Salida, in the Arkansas Valley, there are two centers of activity, one of

Poncha Pass and one at Brown's Canyon. At the latter point the Chaffee County Fluorspar Co. is building a new 50-ton flotation mill. Other producers are American Fluorspar Corp. and Colorado Fluorspar. At Poncha Pass the producers are American Fluorspar and Aksarben Mine.

H. M. Williamson Co., at the Wano mill, and General Chemical Co. at Valmont, are the principal fluorspar producers in the Boulder district, and C.F.& I.'s captive operation continues at Wagon Wheel Gap.

★Shenandoah-Dives' long bout with the National Labor Relations Board, which began with a strike in 1939, is not yet over. A recent Circuit Court decision modified still further the original NLRB order, which had once been amended in compliance with an earlier Circuit Court action asking for a clearer statement of fact. The original NLRB decision prohibited recognition by the company of the San Juan Federation of Miners, an independent union; claimed undue interference by company officials in employees' organizing activity; and called for reinstatement of striking members of the MMSW Union and discharge of 78 men taken on during and after the strike. The Court now discards the matter of interference with the workers, claiming that a few scattered instances of interference by minor officials do not constitute the offense listed in the NLRB order. The Court also calls for discharge of only 20 men hired after settlement of the strike back in 1939. The case has now been remanded back to the NLRB, but pending issuance of the Board's new order in compliance, definite terms are still unknown.

★Hayden Mining Co. (Robert Wilfley and Edward Chapman) is mining a mixed ore of lepidolite (lithium) and microlite (tantalum) at the Brown Derby mine, north of Gunnison. Unusual feature is that they are trucking the ore over the divide to their small new mill at Brown's Canyon, near Salida. The mill uses the new Humphreys spiral concentrator to separate the minerals, and there are no tailings. The operators anticipate a continuing demand for lithium because a number of new processes in which it is used, developed during the war, may mean a much larger postwar use.

★The trimming plant operated for a time in Idaho Springs in conjunction with Colorado's first sheet-mica mining operation at the top of Floyd Hill, near Idaho Springs, has been closed because of the slackening war demand for mica. However, Western States Mining Co., directed by Frank Witt, is continuing to produce mica to be shipped in the rough to Colonial Mica Co., Asheville, N.C., as long as the demand lasts.

★Urad mine of the Molybdenum Corp. of America, at Empire, just this side of the Continental Divide west of Denver, is treating about 50 tons of ore daily with a force of 45 men, which is about half capacity and results from the manpower shortage. It could use

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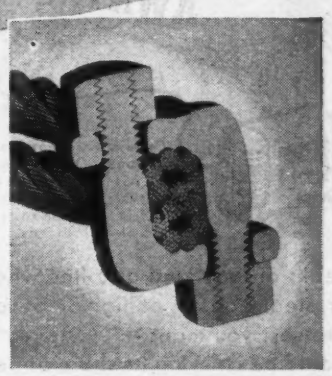

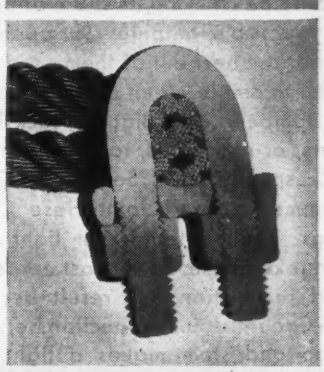

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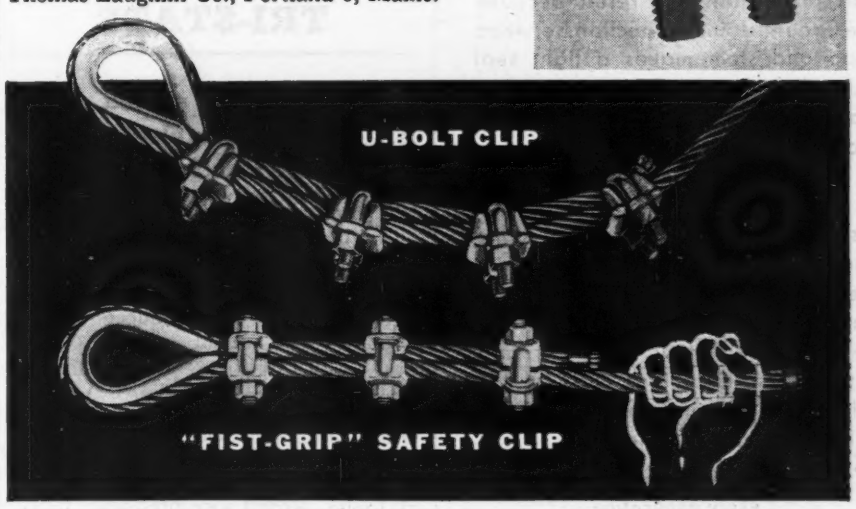

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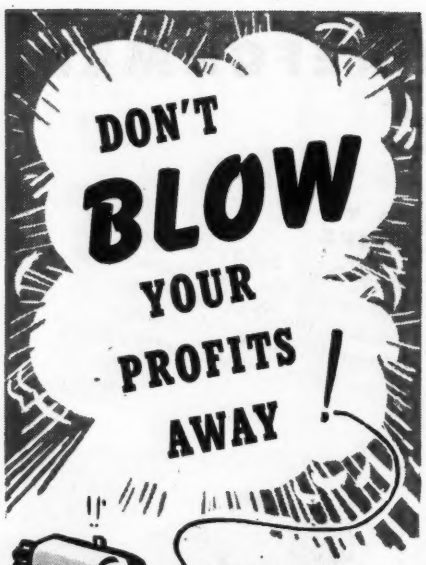

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Colorado *(continued)*

125 men. The property at Urad was wrongly listed on a recent surplus-disposal list of Defense Plant Corp., according to O. R. Whitaker, mining engineer of Whitaker & Schlereth, Denver. "It is private property, bought and paid for," he said.

★Oscar Johnson, president of Mine & Smelter Supply Co., of Denver, now head of Idarado Mining Co., which is operating the Treasury Tunnel and mines near Ouray, has reported that the company's new mill, with a capacity of 300 tons daily, is practically finished and was to start milling operations before Jan. 1. A stockpile of ore from the tunnel is ready for the mill.

★Great Divide Mining and Milling Corp. has begun driving a 1,000-ft. crosscut tunnel near Eureka, to cut across three proved veins at new depths.

★Western Colorado's new high-voltage transmission line has been completed and is carrying a power supply to mines in the Red Mountain district and at Ouray.

★A vocational school of mining, open to anyone, is being established in Idaho Springs as part of the expanded program of the State Board of Vocational Education. Alfred Tellam, miner and millman of wide experience, will be in charge. Instruction will include geology, mining practice, milling and flotation, metallurgy and assaying, and possibly surveying. This is the first such school to be set up in Colorado. Others may be established in other metal-mining centers of the State later on.

TRI-STATE

Open-cut mining started at Galena—Association elects officers—Jane E Company changes name to Scott Mining

★O. W. Bilharz, of Baxter Springs, manager of the Bilharz Mining Co., was elected president of the Tri-State Zinc and Lead Ore Producers Association at the annual meeting of the association directorate held Dec. 11 in Picher. He succeeds Charles A. Neal, Miami mining and business man. Other officers named for the ensuing year were Hamilton A. Gray, of Joplin, first vice president; George W. Potter, of Joplin, second vice president; L. G. Johnson, of Baxter Springs, treasurer, and Fred F. Netzeband, of Joplin, acting secretary, who has been serving in the absence of Captain James K. Richardson, now in the armed services. C. A. Beck, of Miami, a member of the directorate for many years, announced his retirement, and his son, R. H. Beck, also of Miami, was named to succeed him. At a membership meeting earlier, Gray and H. G. Weidman, of Baxter Springs, were elected to the 1945 board of directors, succeeding John A. Robinson and R. O. Gibson, both of Miami. In addition to the newly elected officers, excepting Netzeband, other directors are Victor C. Allen, retiring second vice president; Paul Childress, F. W. Gooch, and D. G. Harrison, all of Joplin; H. H. Hartzell and H. H. Utley, of Baxter Springs; Neal and S. L. Kenney, of Miami, and J. J. Inman, of Webb City.

★The Galena Mining Co., under the direction of Fred Childress, of Joplin, manager, is making preparations to mine by open pit a portion of the old Southside tract, east of Galena, where the company has been conducting mine operations from the Bailey shaft the last several years. A large power shovel and bulldozer are being used to make a roadway for trucks down into an old cave a short distance southeast of the Bailey shaft. An upper level of ore will be mined from the cave. Ore will be trucked to a loading ramp north of the Bailey mine, where it will be shipped by rail to the Eagle-Picher Central mill, in Oklahoma. Stripping, or open-pit mining, in the Galena area was inaugurated a few months ago by the Mess Cave Mining Co. on the Robeson land, where Short creek was diverted several years ago under a WPA project. After removing a few feet of overburden from the bed of the creek, the Mess Cave company is mining a fairly good body of ore, both in grade and recovery values. This ore also is being shipped to the Central mill. The Eagle-Picher Mining & Smelting Co. also is doing some stripping farther down the creek in the Murphy bottoms of the Galena area.

★MacArthur Mining Co. is rebuilding a large derrick and hopper over its No. 2, or south, shaft on the Embree lease, four miles west of Baxter Springs, which were destroyed by fire, on Dec. 5. The fire was caused by a short in an electric motor powering a large turbine pump in the shaft, and the loss was estimated at $7,500.

★The name of the Jane E. Mining Co., which has been operating the old Century Zinc Co.'s mill and mines on the Scott land, east of Hockerville, has been changed to the Scott Mining Co., according to J. L. Nelson, of Baxter Springs, superintendent. The change in the name of the operating company was made effective Dec. 1.

★Dr. Wei-Tung Hu, general manager of North Yunnan Mining Administration of China, was guest speaker at a special meeting of the Tri-State section, American Institute of Mining & Metallurgical Engineers, held Nov. 28 at the Tri-State Zinc and Lead Ore Producers Association offices in Picher. He described general conditions and pertinent facts relative to mining in China. He is a member of a special commission of engineers and purchasing agents sent to this country to study mining techniques and other industrial methods. Dr. Hu received his training as a mining engineer at the schools of mines of Michigan, Missouri, and Columbia universities.

E. G. Barker, representing the WPB tin-lead-zinc division on the premium price plan quota committee, and E. D. Moulds, an analyst of OPA, spent the latter part of November and the early part of December visiting in the local mining field. They conferred with leading operators in the field, but made no public announcement concerning their visit prior to returning to Washington.

NORTH CAROLINA

New mining laboratories at Raleigh and Asheville—Mica operators protest WPB order

★North Carolina State College, Raleigh, N.C., has announced plans for the establishment at Asheville, N.C., of a mining engineering laboratory to work with mining interests in western North Carolina. The laboratory will be operated at State expense, but the United States Bureau of Mines and the Tennessee Valley Authority will cooperate in the project, according to L. L. Vaughan, acting dean of the college engineering school. A building to cost between $30,000 and $40,000 will be erected on property deeded to the college free of charge by the City of Asheville, and equipment and facilities costing "several thousands of dollars" will be installed.

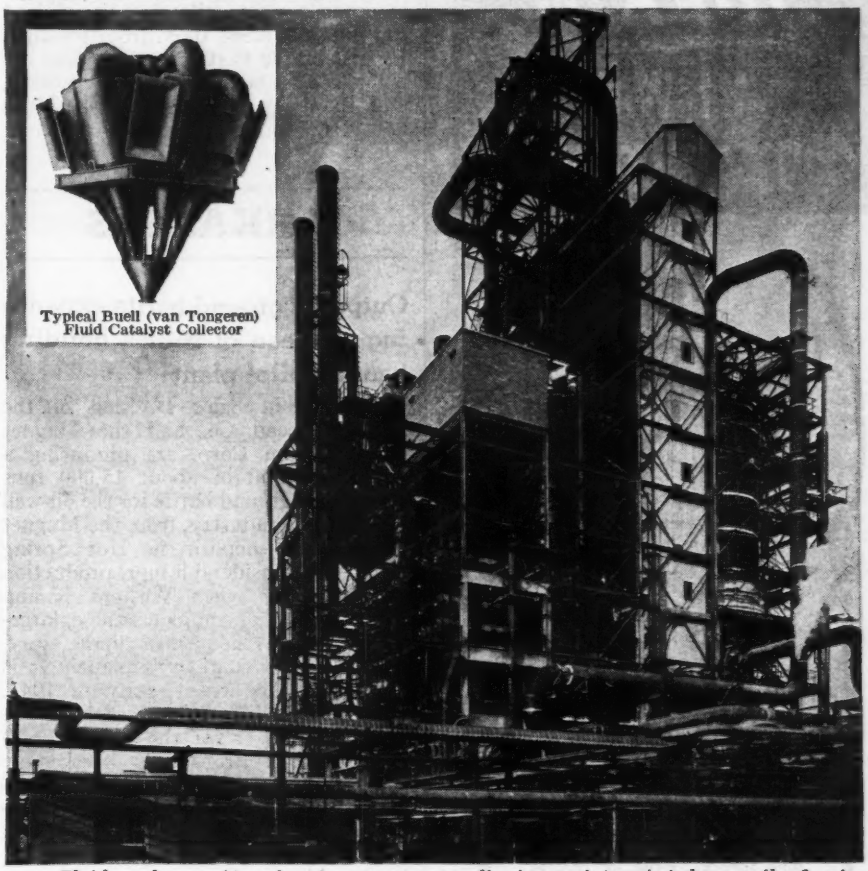
★The United States Bureau of Mines has announced that manganese and tungsten experiments are being added to the sponge-iron work being conducted by the Bureau at North Carolina State College, Raleigh, N.C., under the direction of A. L. Fox. Test drillings have revealed substantial deposits of tungsten and manganese in the State.

The sponge-iron open-hearth furnace will give North Carolina the first government open-hearth building in the country, the government up until now doing its war work in a small private open-hearth at Pittsburgh, Pa. Most of the iron ore for the North Carolina exploratory war work is coming from Cranberry, N.C.

Agreement has been reached between the college and the Bureau for the lease of property on which to erect the furnace and for adequate office and laboratory space, and reports state that the present staff, which was set up in Raleigh several months ago, will be increased and that the Raleigh branch will be expanded into a central office and laboratory to serve the entire Southeast.

★An order of the War Production Board instructing the Colonial Mica Corp. to cease purchasing mica other than "ruby" during the first quarter of 1945 has been rescinded, as a result of protests by North Carolina mining operators and State officials. Declaring that little mica of this type is produced in North Carolina, the operators contended that the WPB order would force 90 percent of the State's 700 mica mines to close. Governor Broughton has announced

CATALYST RECOVERY



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North Carolina (*continued*)

that, with the order rescinded, enough equipment will be allowed to remain at the mines to keep them from flooding. He also stated that the mica mines are being reclassified by the government, and that some originally classified as non-ruby would remain open.

ARKANSAS

Output of ground barite expanding—Bureau of Mines building bauxite pilot plant

★The Baroid Sales Division of the National Lead Co. and the Magnet Cove Barium Corp. are producing a combined total of about 15,000 tons monthly of ground barite for the oil-well drilling-mud industry, from the Magnet Cove barite deposit in Hot Spring County. Considerable more production is anticipated when Western Knapp Engineering Co. completes the enlargement and revision, now under way, of the Baroid company's plant. It is expected to be ready early in 1945. O. J. Benston, of Malvern, Ark., is the general manager for the Baroid company. Harry Brown, also located at Malvern, is president and general manager of the Magnet Cove company.

The U. S. Bureau of Mines has a diamond core drilling project under way in the Magnet Cove barite region to determine whether other deposits of barite occur in favorable geological areas adjacent to the deposit being mined. J. R. Thoenen, of Little Rock, is the district engineer, and R. B. McElwaine is the project engineer directing drilling operations for the Bureau.

Recent mine development and Bureau of Mines drilling indicate that the original theory, that the barite in the Magnet Cove area migrated up radiating synclines from the Magnet Cove intrusive and was concentrated in the closures, is in error. It is now believed that the thermal waters, characteristic of the Ouachita area, carried the barium, and that replacement occurred in localized areas where the base of the Stanley shale formation was highly calcareous.

A new discovery of barite has been made in southern Montgomery County, near Caddo Gap. Indications are that it is a large deposit of good grade. It is under lease to the Baroid Sales Division of National Lead Co. The company's geologist, Kenneth L. Cochran, is conducting a systematic trenching and sampling program to determine the commercial possibilities of the deposit.

★A geologist of the U. S. Geological Survey is mapping the property of the Magnet Cove Titanium Co. The owners have trenched the pit floor to facilitate mapping the structure. The Bureau proposes to examine the property with reference to reserves and metallurgical treatment of the ore.

★Bird & Sons, of East Walpole, Mass., have erected a mill to produce roofing granules near Glenwood, Pike County. The material used is from the Big Fork Chert formation. The rock is mined and delivered to the mill by contract. Production of 50 tons for each 8-hr. shift is anticipated. John Timms, of Glenwood, is local manager. The company owns and operates an asphalt plant near Waterloo.

★The Jones Mill Aluminum plant, near Hot Springs, has reduced production of aluminum metal by 3,000,000 lb. a month on orders from the War Production Board.

★Six small companies, operating underground bauxite mines, have organized the Independent Mine Owners Association, and will attempt to have the Metals Reserve Corp. extend the market sufficiently to enable them to mine ore already developed before closing their mines. Otherwise, this ore will likely be lost permanently, due to heavy ground.

★The U. S. Bureau of Mines is constructing a bauxite pilot plant near Bauxite. It is hoped to develop a commercial treatment for millions of tons of low-grade bauxite and bauxitic clays that have been proved by the Bureau's bauxite drilling project in this area.

★Production of manganese ore in the Batesville-Cushman field dropped to its lowest monthly 1944 tonnage in November, but a substantial increase is expected in December. Production is governed largely by weather conditions and available labor. Both of these elements reduced production in November, which ran to approximately 872 tons, of which 406 tons was high grade and 466 low grade. The following companies contributed to the total production in the tonnages indicated: Denison Manganese Co., 256; Arkansas Manganese Co., 259; Chin properties, 225; Chas. Sims, 75; Hendricks Mining & Milling Co., 37; Austin 20.

Major Ruggles, who is in charge of Metals Reserve buying depot at Batesville, which has been purchasing the major tonnage of high-grade ore produced in the field for over a year, says that the closing of the depot is now set for July 1, 1945.

Local operators who are opposing the new phosphorus penalty of 0.3 percent have taken the problem to Washington and expect action to be taken on it in a short time. No explanation has been given the operators why this penalty was imposed.

Davis Mining Enterprises has purchased the plant and buildings of the Hendricks Mining & Milling Co. and will operate them in the near future. This will give the Davis concern two of the largest mills in Arkansas. It also has a lease on the Southern Hill, which it is operating with power shovels and bulldozers, with a fleet of 27 trucks.

★Operations in the North Arkansas zinc and lead field are making some gains, but are far below those during

the first World War. S. & G., Inc., was the largest producer in the field during November and early December. The company shipped two carloads of high-grade carbonate concentrates. Operations are in charge of Tom Grimmett and J. C. Shepherd, of Harrison, Ark. Most of the mill difficulties have been overcome and the big plant is now in operation most of the time. Production should show a gradual gain, as there is plenty of crude.

★The Moark Mining Co., operating several properties in the zinc area has discontinued ground operations. The small milling plant is now being used by James Rogers, operating the Coon Hollow. All of the ore produced on the Coon Hollow in past years has been lump silicate of zinc. In making test runs of the old dumps of the Moark mill, it was discovered that they were rather rich in fine ore. Recovery ran to 10 percent concentrates. It is estimated that there is 15,000 tons of crude in the dumps.

★Louis Frader and associates, of Eureka Springs, operating the Section 16, in Marion County, near the town of Buffalo, have the new road to the mine completed except surfacing. They are gradually getting their equipment together, and recently purchased a small fleet of trucks to take care of their transportation problems. They have opened up some rich faces in their tunnel operation.

★The Bureau of Mines is carrying on a geophysical program to determine structure on the titantium property of the Magnet Cove Titanium Co. and on the Golden-Estes molybdenum property in the Magnet Cove region. A ratiograph, utilizing deflection of electric current through the ground, is being used. Mark C. Malamphy is engineer in charge and R. B. Spence is carrying out field work.

★The Dixie Bauxite Co. leased its mine and properties to the Dulin Bauxite Co. upon termination of Dixie's contract with the Metals Reserve Co. P. A. Dulin, Sr. (retired), originally opened the Dixie mine many years ago. He subsequently left the Dixie organization to form the Dulin Bauxite Co. The circle has now been completed by Dixie leasing to Dulin Mining Co., now being operated by P. A. Dulin, Jr.

★The quicksilver district in southwestern Arkansas is completely inactive except for individual high-grading and prospecting operations of the Wall Mountain Mercury Co. The 30-ton rotary reduction plant of the Union Mining Co. has been dismantled and shipped to Mexico. Humphreys Gold Corp. has dismantled its 80-ton rotary reduction plant and shipped the kiln to Florida to treat beach sands carrying ilmenite. Two other Arkansas mercury reduction plants—Superior Mercury Co. and Caddo Quicksilver Co.—are reported to be slated for shipment to Mexico.

★A new limestone quarry has been

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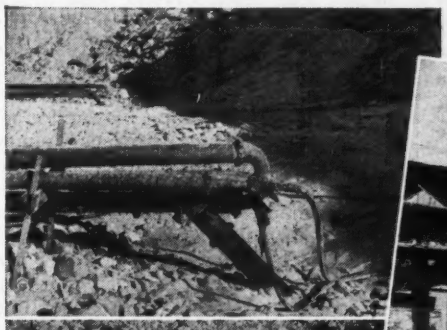

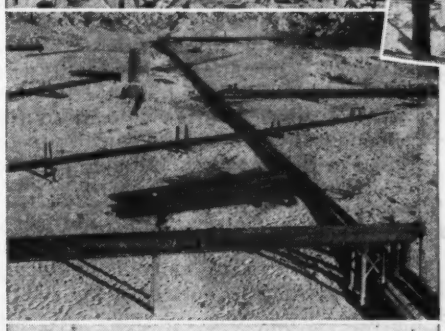

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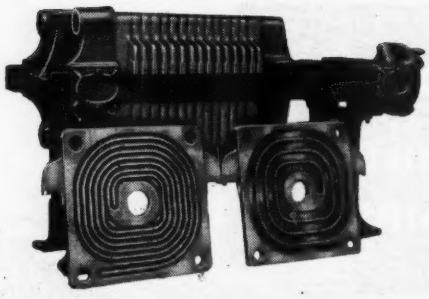

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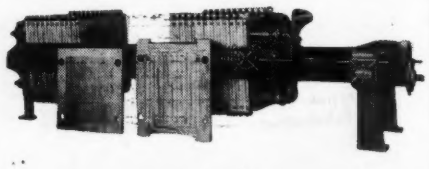

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Arkansas (*continued*)

opened in the Magnet Cove area by a Shreveport, La., concern. It is reported that the company intends to start immediate construction of a crushing plant to manufacture agricultural lime. The material is a calcite deposit in the Magnet Cove intrusive.

WASHINGTON

Gorrien mine shipping zinc and lead to Bunker Hill—Crescent shipping manganese

★Most of the metal mining at present in this State is in the two northeastern counties. Washington Water Power Co. has extended its lines into northern Stevens County, and only awaits authority from the WPB to build a 50-mile line from Colville east across the mountains to Metaline Falls. The company expects this authority in the immediate future. In the meantime it has increased its voltage to Colville, which will give it ample power for all the mines in northern Stevens County and in the Metaline district in Pend Oreille County. The agreement previously made by Washington Water Power Co. with Kootenay Power & Light Co. to bring power down to the International Line, where it was to be picked up and brought into Metaline Falls, has been cancelled by the Kootenay Company, but Washington Water Power Co. put into Metaline Falls wire and poles sufficient to build the 10 miles of line north from that town to the boundary. This supply is ready to be used in the line from Metaline Falls to Colville.

★The old Gorrien mine, formerly known as the Deep Creek property, in northern Stevens County, is producing steadily from the bottom of the 200-ft. shaft. Sixty tons of zinc ore are hauled each day to the Sierra mill, 12 miles distant, where it is milled and from which the concentrates are shipped to the Bunker Hill smelters at Kellogg, Idaho. High-grade crude lead ores are shipped separately to the same smelter. Additional lead orebodies of high grade are also being developed. Cy Higgenbottom heads this enterprise and has recently been joined by Frank Mitchell, of the Willow Creek Co.

★Paul S. Seeley, of Cambridge, Mass., has acquired the Electric Point mine, at Leadpoint, and has put miners to work repairing and retimbering the lower tunnel and the old shoots. Associated with him are Roy Davidson and George Simons, mining engineer of eastern Oregon. They have installed a compressor and other equipment, which Mr. Seeley expects to use in reopening the mine from the main tunnel, which cuts the orebodies at a depth of more than 400 ft. Promising ore is shown where the work stopped years ago. Mr. Seeley plans to increase his crew and speed production. This property produced $2,000,000 worth of high-grade lead ore years ago and paid large dividends. Arthur Simonton, of Leadpoint, later acquired the mine and made the deal with Mr. Seeley. A large bulldozer has been delivered at the mine and will be used in trenching surface showings of hematite iron ore in which the lead occurs in chimneys. P. Evan Oscarson, district supervisor of the U. S. Bureau of Mines, has announced that considerable diamond-drill exploration will be conducted this winter on properties near Leadpoint.

★Rowland King, mining engineer of Spokane, who is in charge of the Crescent mine, near Port Angeles, says the property is producing steadily 500 to 600 tons a month of ore that carries 52 percent manganese. It is delivered to the government and stockpiled at Port Angeles. The government buys the ore at the mine, paying $1 a unit, long-ton measurement.

★Robert Taylor, associate radiologist of Washington State College, at Pullman, is opening a laboratory in Spokane, devoted to X-ray and radium inspection of metals. He says the equipment being installed is valued at $3,000. For the last year Mr. Taylor has managed the magnesium pilot plant at the State College.

MICHIGAN

C&H enters secondary metal field—Drifting on 41 level of Centennial shaft—Hoists being built for Russia

★Drifting is proceeding on the north side of the shaft from the 41st level of the Centennial mine of Calumet & Hecla Consolidated. This is the first drifting in the shaft since the mine closed 13 years ago. The drift is now more than 1,300 ft. from the shaft through ground that looks encouraging. Drifting on the south side of the shaft from the 41st will soon get under way.

Calumet & Hecla Consolidated has put into effect a retirement income plan covering salaried employes earning in excess of $3,000 per year. Under the Federal Social Security Act, income over $3,000 per year is not taxable and Social Security benefits are not figured on anything over that amount. The Calumet & Hecla plan will supplement the income that participants will receive from the Federal plan upon retirement. Participants are required to contribute to the plan in accordance with a prearranged schedule.

A new department, known as the secondary department, has been formed by Calumet & Hecla to purchase and treat scrap copper-bearing material. H. C. Kenny, smelter superintendent, will be in charge. Experiments conducted in the treatment of scrap led to the decision to enter this field. Scrap will be purchased in the market for

treatment at the Torch Lake plants. This is another step in the company's policy of expansion, which includes the continued exploration for new orebodies as well as research work leading to new uses for copper.

The foundry and machine shop of Calumet & Hecla Consolidated are doing some special work for the Lake Shore Engineering Works of Marquette, Mich. The foundry is casting 48 large cast iron engine bedplates, and the machine shop is working on three 68-in. hoist drums. These products will be shipped to Russia.

IRON COUNTRY

Hanna company acquires part of Evergreen's reserves—Enlarging Carey mine's 2,600-ft. borehole

★Diamond drilling of known mineral deposits in Cook County, Minn., will be carried out under terms of an agreement reached by the board of regents of the University of Minnesota with the Minnesota Iron Range Resources and Rehabilitation Commission. The project will be directed by the Minnesota Institute of Research, a university organization, and the Minnesota Geological Survey, of which Dr. F. F. Grout is head. The commission will provide about $25,000, which will be expended for drilling, and will report its findings and estimates. The area selected is said to have enormous outcrops of magnetic iron ore.

★Great Lakes cargo fleet moved a total of 81,170,538 tons of iron ore to Eastern docks and furnaces from the Lake Superior district during 1944. This tonnage was the third largest in history. The year's shipments were in line with the War Production Board's goal and provided the steel industry with sufficient supplies to last well into the spring at the present rate of consumption. November shipments amounted to 4,672,367 tons, compared to 6,940,503 tons transported in the year 1943.

★Butler Brothers, commemorating 50 years of adventure in business, has issued a golden anniversary edition of "The Butler Miner," a company publication, dedicated to the "old-timers" as a token of deep esteem for long and faithful years of service. The publication traces the birth of the Butler Brothers industry in the Iron Country, telling a pictorial story of the first mining locations, among them Cooley, Carson Lake, Nashwauk, Leetonia, and the village of Hibbing. Contrasting the old scenes with new ones, the anniversary edition tells the story of progress from the early days to the more efficient modern methods. Today, Butler Brothers are still pioneering in methods of production with research and experimentation.

★The Hanna Iron Ore Co. has purchased from the Evergreen Mines Co.

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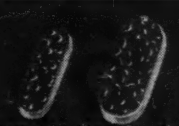

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Iron Country *(continued)*

about a third of its Cuyuna Range reserves, including its interest in the Oberg, Healy, Evergreen, West Meacham, Croft, Diagonal, and Chisholm-William properties. These properties are in the village of Crosby, together with a sintering, crushing, screening and washing plant near by. With the Wearne and Portsmouth mines, they have been under lease to the Hanna company, constituting the Evergreen group and making one large open pit, which has been operated by Evergreen for the joint account of both companies since 1930. The Hanna company will take over the operation of the entire group, with Guy B. Hunner as superintendent. It is expected that changes will be made to modernize the sintering plants.

★The dock at Ashland, Wis., saw the loading of the last cargo of iron ore from the Lake Superior ranges for the 1944 season when the "Amasa Stone" cleared the harbor on Nov. 28. In previous years the month of December was needed to complete shipments, but due to a sufficient number of boats and to the small tonnage, requirements were met before November closed. The weather was so mild that no steaming of railroad cars was necessary to thaw frozen ore.

★At Carey No. 2 mine, operated by Pickands, Mather Co. at Hurley, Wis. the new Nordberg electric hoist is now in operation. The steel headframe, built by Bethlehem Steel Co., has been erected, and work is under way enlarging the 66-in. borehole to full shaft size and installing the steel sets. The rock broken down by blasting is removed from the bottom of borehole on the 2,900-ft. level. The shaft is now enlarged to its full size for over 300 ft., with the sets lined in and anchored in place. In the engine house the new Sullivan 3,600-cfm. compressor was started and is being tested.

★North Range Mining Co.'s Book mine, at Crystal Falls, Mich., produced 380,000 tons for the season and wound up its operation as an open-pit mine. The 54-B, 2½-yd. shovel and ten Koehring Dumptor trucks were shipped to the Schley mine, on the Mesabi Range, to assist in winter stripping work. Next year ore will be mined underground at the Book and hoisted by two 4-ton skips in balance on a 25-deg. incline. Considerable jig ore has been developed, which will be treated in a plant to be built this winter. R. S. Archibald is manager.

★At the Maas mine of Cleveland-Cliffs Iron Co., Negaunee, Mich., the main shaft was recently extended 100 ft. from the 5th to the 6th level, giving a total depth from surface of 1,540 ft. A winze was sunk from the 5th level, and the main shaft raised from the bottom so as not to interfere with regular hoisting from the upper levels. H. O. Moulton is superintendent.

★Mr. and Mrs. David H. Campbell, Iron Mountain, Mich., were recently awarded $2,631.91 by the Michigan State Supreme Court in their action against the Homer Ore Co. for unauthorized mining, removal, and sale of 63,166 gross tons of ore from the Minkler mine, in Iron County, Mich., in which they own an undivided one-twentyfourth interest. Testimony in this unique case was watched with interest by the mining operators of the Lake Superior region, who see in it a significant precedent for all similar mining operations. Since the suit started in January, 1941, the Homer Ore Co. has removed an additional 200,000 tons of ore from the Minkler mine, for which the Campbells expect an additional award on the same basis as the first one.

ALASKA

Mining and other interests protest creation of Indian reservations to protect so-called "aboriginal rights"

★Hearings in the "Battle for Southeastern Alaska" which were conducted in several Alaska towns for the Department of the Interior were concluded at a largely attended meeting of business men in Seattle on Nov. 15. Richard R. Hanna, former judge of the Supreme Court of New Mexico, presided. Mining, fishing, lumber, and other interests participated. It was claimed the granting of the petition of certain Indians for what they claim are "aboriginal rights" would put an end to many of the big industries in that part of the Territory. Representatives of two labor unions, claiming memberships of 22,000, joined in the protest. Many other protests had previously gone forward. A federal grand jury, at Ketchikan, joined the protest against the creation of more reservations for Indians in Alaska, declaring that such reservations would upset "the entire economic structure of both whites and Indians."

★E. N. Patty, chairman of the Alaska Committee of the Seattle Chamber of Commerce, presented resolutions to the Alaska committee at a meeting in December, protesting against the Hatch bill, which would permit the Secretary of the Interior to grant revocable permits for use of public lands in the Territory in tracts not exceeding 160 acres but within 80 rods of any navigable water. Chairman Patty said the bill is so wide in scope that it would permit the secretary to control mining properties along any stream or other waterway. It was claimed this is a serious threat to Alaska. Edward W. Allen gave a review of recent hearings on the Indian claims for aboriginal rights and Luther C. Hess, of Fairbanks, and R. E. Rasmussen, of Anchorage, said this threat was felt in their communities.

★State Senator-Elect Frank Whaley addressed the Alaska Miners Association, at Fairbanks, in November, and

said five dredges operated in the Seward Peninsula region during the past season. He said operations in the Nome district were limited because of the difficulty in getting supplies over the 70-mile Nome tramroad. One operator was reported to have shipped in oil at a cost of $30 a drum.

★Goodnews Bay Mining Co. closed its dredge and dragline operations on Nov. 1, after working steadily in the production of platinum since June 1. The 25 officers and men flew from Goodnews to Anchorage, and then took ship to Seattle. Among them were Ed Olson, vice president and manager; Charles Johnston, treasurer; Winston Spencer, engineer; Al Gould, dredgemaster; and Fred Wolf, engineer.

★Charles J. Johnston, treasurer of Goodnews Bay Mining Co., has been reelected president of the Alaska Miners Association at Seattle. The directors have recommended the early completion of the Haines Highway connecting Haines with the Alaska Highway. Other officers of the association are L. McGee, Anchorage, vice president; executive committee, Roy B. Earling, Luther C. Hess, and Capt. A. E. Lathrop.

★John Ogriz and Gus Uotila have acquired extensive placer ground on the South Fork of the Koyukuk and are moving in equipment and putting up buildings this winter preparatory to operating next season. Ogriz will look after the firm's operations at Flat and the other partner will be in charge of the Ophir operations.

★Ohio Mining Co. continued operations until the middle of November in the Fairbanks district. Considerable machinery has been sent to the property.

★E. L. Bartlett, the new Delegate to Congress from Alaska, said before leaving for Washington, that he will use every effort to bring about the resumption of gold mining under conditions which will be attractive to the miners and will meet the handicaps of higher costs of labor and supplies.

CANADA

Howe Sound's Snow Lake property promising—Hudson Bay gets high copper-zinc recoveries

★Plans for postwar employment in Canada have established the objective of providing jobs for 25 percent more people than the 1939 total of 3,640,893. Of this number, the mining industry accounted for 95,335, compared with the estimated 120,000 or more postwar jobs to be made available. Each year the goal is to be increased to provide for population growth. Mining is classed with the six occupational groups that offer promise of expansion on a scale above the average. Success in raising Canadian living standards is considered to be contingent on increasing export trade, in which minerals

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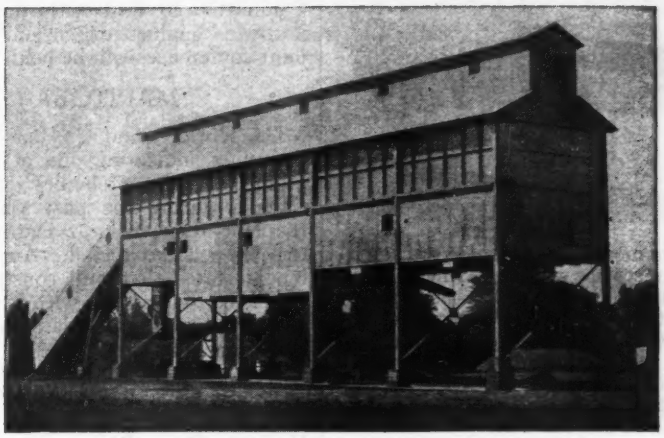

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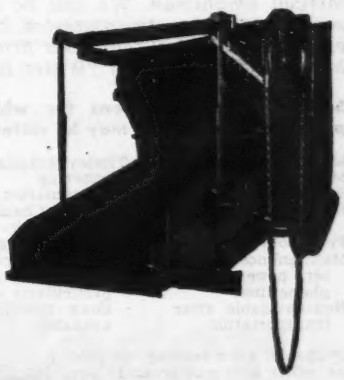

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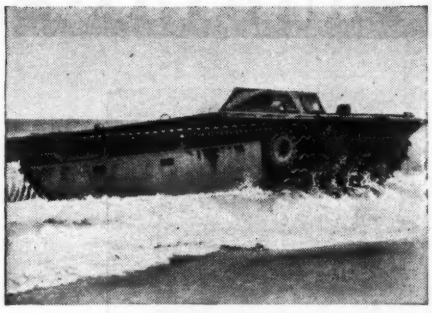

One of the most useful types of war vehicles now in service with the Armed Forces, particularly in the Pacific, is the amphibious tractor known as "Water Buffalo," or LVT (Landing Vehicle, Tracked).

As the designers (in cooperation with the Bureau of Ships, U.S. Navy), engineers and manufacturers of "Water Buffalos," we of Food Machinery Corporation believe there will be a postwar market for amphibious tractors redesigned and built for *commercial* use. The purpose of this and similar advertising is to find out if we are right.

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Canada *(continued)*

have held a position of increasing importance in the past ten years.

★Ministers of Mines for Nova Scotia, Quebec, Ontario, Manitoba, Alberta, and British Columbia met recently for consideration of postwar problems of the Canadian mining industry. Among the matters discussed were elimination of multiple succession duties and taxes; lowering or abolishing artificial barriers between provinces to encourage investment of outside capital; closer cooperation among the Dominion and Provincial mining departments. Discussion of these and other topics led to the setting up of a Mines Ministers Committee to deal with problems of postwar mining expansion. Further joint conferences will be held.

MANITOBA

★The Howe Sound Co. has been successful in indicating one of the more promising new orebodies located in Canada during the past year. This, the Nor-Acme, is near Herb Lake, in the Snow Lake region. An unofficial report states that mill construction is under consideration, with a capacity upwards of 1,000 tons daily, as a result of the medium-grade ore indicated by drilling. To a depth of 1,200 ft. reserves are estimated at $10,000,000. A connection is being made with the Hudson Bay Railway by an all-weather highway 33 miles long. North of the Nor-Acme ground, a property has been acquired by Consolidated Smelters; diamond drilling is planned by Pioneer Gold Mines of British Columbia and Northern Canada Mines on claims located to the southwest. Other operators, including International Mining Corp., have acquired holdings in this same area, and considerable drilling is in prospect this winter.

★Wekusko Consolidated is expected to make an early decision on a program of underground exploration for the Ferro-Rainbow property, in the Snow Lake section, where diamond drilling has been under way since last summer. Some years ago a shaft was put down to 160 ft. and lateral work done. A 15-ton mill on the ground is to be used for bulk sampling. The Kiskoba group, where gold was first discovered in this area, has been taken under option, and a diamond drill was installed early in December. Consideration is being given additional drilling on the Reed Lake group, where 11 holes put down in 1944 resulted in a promising gold discovery. R. J. Jowsey is president of Wekusko, which is financed by Ventures Ltd. and its associates, God's Lake, and Moneta.

★Average copper and zinc recovery by Hudson Bay Mining & Smelting Co. from copper concentrate in 1943 was the highest on record. About 70 percent of the zinc contained in the ore was recovered, including 63,000 tons stockpiled as residue from the zinc refinery, and 33,000 tons of zinc concentrate. The residue contains an estimated 125,000 tons of zinc, for the recovery of which a pilot plant has been used for several years in an attempt to develop a satisfactory process. Extraction of other metals contained in the Flin Flon ore amounted in 1943 to 92 percent for copper, 77 percent for silver, and 75 percent for gold. Precious-metals recovery averaged $3.95 per ton and operating costs were $5.08 per ton in 1943. W. A. Green is general manager.

ONTARIO

★Initial output from Steep Rock Iron Mines, at Atikokan, amounted to 16,411 tons of high-grade hematite. This was delivered by rail to the dock at Superior, Wis. Ore docks at Port Arthur, Ont., are to be ready for shipments in 1945, when it is planned to deliver approximately 1,100,000 tons. Ore will be stockpiled this winter following the removal of muck that slumped into the open pit in the lake bottom, which interfered with plans for 1944 shipments. George G. Blackstock has resigned as executive vice-president.

★In the annual report of MacLeod-Cockshutt Gold Mines, Fred G. MacLeod, president, states that satisfactory results have been secured in developing the north ore zone on the eighth and ninth levels. Crosscutting has not yet advanced as far as the zone on the tenth and eleventh levels. Further reductions in the number of miners employed is expected to result in shutting down the 1,000-ton mill, which has been averaging less than 350 tons a day.

★The ore-bearing structure on the property of Upper Canada Mines is believed to continue westward across the Biroco Kirkland Mines ground in Gauthier Township, where low gold values over substantial widths have been found in recent drilling at a point 350 ft. east of the Erin Kirkland Mines boundary. The latter company in December was putting down a deep hole in an attempt to pick up extensions of the zone. A second drill hole is to be located on the boundary between the two groups of claims. James and Buffam are consulting geologists for Biroco. Diamond drilling is also in progress on the adjoining Anoki Gold Mines ground, following a geophysical survey. Walter Woods is mine manager at Anoki, where, prior to the shutdown in 1941, a 750-ft. shaft was sunk and work was done on five levels. Anoki is controlled by Bankfield Cons. Mines.

QUEBEC

★The extent of exploratory work in Northwestern Quebec is indicated by the number of mining claims recorded, the scale of trenching and other surface work, and diamond drilling. In these respects, as well as in the number of properties developed to the stage where shaft sinking is warranted, Quebec leads all other Canadian mineral areas. Of several companies that have announced plans for underground development based on extensive diamond drilling, Wasa Lake Gold Mines is preparing to build a 500-ton mill. Plans for shaft

sinking, which may be slow in materializing after Metals Controller's Regulation 19 has been rescinded, due to the lack of trained crews and experienced miners, have been announced by the following companies: Louvicourt Goldfield Corp.; Beacon Gold Mines (Teck-Hughes controlled); and Belleterre Gold Mines (on the Conway and Vaquin options in Guillet Township). In Bourlamaque Township: Aumaque Gold Mines, where diamond drilling has totaled 60 holes; East Sullivan Mines, where nine drill holes have indicated promising possibilities that are being investigated this winter by five drilling machines; and Obaska Lake Mines (Frobisher Exploration). In Rouyn and Joannes townships: Rouyn Merger Gold Mines, which is being equipped with a plant purchased from McWatters and is planning to sink a shaft to 1,500 ft.; Hosco Gold Mines; and Anglo-Rouyn Mines. In Malartic Township: National Malartic Gold Mines and East Amphi Gold Mines.

★Robert H. Basserman, general manager, Sladen Malartic Mines, reports gold recovery amounting to $716,242 for the first nine months of 1944, averaging $3.80 per ton. Operating costs averaged $3.33 per ton, with operating profit amounting to $80,853. There was a drop from 675 to an average of 467 tons a day in ore run through the mill, as a result of labor shortage and absenteeism. An extensive program of exploratory drilling is to be carried out on the 1,425-ft. level.

★Lapaska Mines, controlled by Lapa Cadillac Gold Mines, has been active in exploring its large group of claims adjoining Louvicourt Goldfields on the west. The first eight of a series of diamond-drill holes have been completed for testing a section of the property that is under deep over-burden. Former owners reported $50 assays across 2-ft. widths from samples taken in a shallow pit and in drill core from a 557-ft. depth. Denison Denny is president.

★A diamond-drill program amounting to 20,000 ft. has been laid out by Paul d'Aragon, consulting engineer, Tasmaque Gold Mines, for the No. 2 property, in Louvicourt Township. The first hole was stated to be continuing in overburden at 135 ft. depth. An attempt will be made to cross-section the claims by means of a series of drill holes, and to explore the diorite dike that is considered to be an extension to the east of the intrusive that has been tested by Louvicourt Goldfield Corp. T. A. Sutton is president of Tasmaque, one of a group of companies active in testing the promising zone that extends about seven miles east of the Lamaque mine along the south contact of the Bourlamaque batholith. Electric power is available to this district, which is convenient of access over the Abitibi Highway and Canadian National Railways.

★Favorable results have been reported from surface exploration on ground in Blondeau Township by Bontera Mining Corp. Julius M. Cohen, consulting

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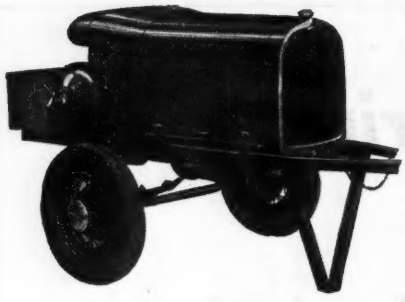

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Canada (*continued*)

engineer, states that diamond drilling will be started in January on the 400-acre property.

BRITISH COLUMBIA

★The value of mineral production in British Columbia during the calendar year 1944 has been estimated at $50,830,000 by H. Sargent, chief mining engineer of the Provincial Department of Mines. This compares with $65,892,395 in 1943. His estimate includes the following detail.

Principal Metals	1943	1944
Placer gold	$ 462,270	$ 315,000
Lode gold	8,639,516	6,890,000
Silver	3,858,496	2,820,000
Copper	4,971,132	4,360,000
Lead	15,214,417	10,760,000
Zinc	13,405,481	10,720,000
Total value principal metals	$46,551,312	$35,865,000
Miscellaneous Metals	7,197,871	2,325,000
Coal	7,742,030	8,175,000
Structural Materials	3,039,148	3,075,000
Miscellaneous non-metallics	1,362,034	1,390,000
Total value mineral products	$65,892,395	$50,830,000

★Net smelter return of $40,516 was received by Silbak Premier Mines, Ltd., Portland Canal district, from October production of 5,249 tons, averaging 0.19 oz. gold and 1.79 oz. silver per ton. Estimated operating loss before write-offs was $1,783.

★The annual report of Bridge River Consolidated Mines, Ltd., Lillooet district, reveals a marked change in the membership of the board of directors during the fiscal year ended Oct. 31 last. Almost all of the present directors are also serving on the board of Jason Mines, Ltd., Ontario gold producer. They are: Cooper Drabble, H. O'R. Dyer, Robert Colquhoun, J. M. Taylor, and Col. E. M. Thomson, the last-named being president of the reorganized board. J. C. Ralston, Vancouver attorney, is secretary. Work in progress at the company's property adjoining B.R.X. in the Bridge River valley includes diamond drilling, surface stripping and trenching, and road construction to projected diamond-drill stations. After a long description of the geology of the property, Cecil Rutherford, consulting engineer, states in his report to shareholders: "With good roads within three-quarters of a mile of a possible millsite, hydroelectric power within half a mile, and a geological setting so similar to the very successful Bralorne mine (only three-quarters of a mile distant), a very pleasing and profitable operation could easily result."

★As had been anticipated, owing to recent large-scale purchases of stock, the protesting vote at the extraordinary general meeting of shareholders of Grull-Wihksne Gold Mines, Ltd., Lillooet district, was sufficient to unseat members of the board of directors and elect in their places G. L. Fraser, W. C. Mainwaring, Leon J. Ladner, Howard Forrester, and E. B. Crickmore. Mr. Fraser has been elected president, Mr. Mainwaring vice president, and H. T. Wilson has been retained as secretary-treasurer. Diamond drilling of the company's property, adjoining Bralorne on the north, has been deferred until next spring.

★November production of Cariboo Gold Quartz Mining Co., Ltd., was 941 oz. gold, valued at $36,229, from 2,733 tons, averaging 0.34 oz. gold per ton.

★November production of Island Mountain Mines Co., Ltd., Cariboo district, was 721 oz. gold, valued at $27,760, from 1,739 tons, averaging 0.414 oz. gold per ton.

★The annual report of St. Eugene Mining Corp., Ltd., reveals the scope of that company's operations in British Columbia, Yukon, Alaska, and the northwestern United States. Active development of the company's promising lead-zinc-silver project at Moyie, East Kootenay district, has been postponed until world conditions are more settled and market prices of lead and zinc are more conducive to profitable operation. An agreement to purchase the Lone Star copper mine, Ferry County, Wash., has been negotiated. The project is being held for development when the price of copper is more favorable and equipment and supplies are more readily available. An option has been obtained on an "equitable" basis to acquire a 60 percent interest in the Camas gold mine, in Blaine County, Idaho. Ridgeway R. Wilson, president and managing director, describes this as having the "earmarks of a successful gold mine when war restrictions are removed." Several promising placer-mining projects have been acquired in British Columbia by staking and under lease and option. These include the Spanish Creek, Sovereign, Tertiary, and Ashby-Speer projects, Cariboo district; and Two Brothers, north-central British Columbia. Purchase has been made, on favorable terms, of the old Ikeda copper mine, on the Queen Charlotte Islands. The property, in the opinion of company engineers, warrants further development and diamond drilling as soon as the price of copper justifies proceeding. Options have been arranged on the Maid of Erin copper mine, Rainy Hollow district, British Columbia. A substantial tonnage of good-grade copper ore carrying considerable silver has been indicated by preliminary development and diamond drilling. The new cut-off road from Haines, Alaska, has greatly improved transportation to the area. Two large copper deposits in Alaska have been acquired under option on favorable terms, after examination and reports by the company's geologist, Alexander Smith. The company has three promising gold projects under investigation in Alaska. An interest of 75 percent has been acquired in the

Lynn Creek zinc deposits, close to the City of Vancouver. Control by lease of a valuable limestone deposit on the west coast of Texada island, with sheltered harbor for loading, has also been obtained. Frobisher Exploration Co., Ltd., sister subsidiary of Ventures, Ltd., has co-operated closely with St. Eugene.

YUKON TERRITORY

★A near-stampede has occurred in the Klondike as a result of reports that large concerns with modern equipment have entered the field. Prospectors have rushed to streams which once were alive with gold seekers. Claims have been long since abandoned as presumably worked out, but the men now entering the districts believe that under modern conditions old creeks and rivers will again become productive. Many miles of ground have been restaked on Barker, Kirkman, Moose, Stevens, Henderson, Rosebud, and other creeks and tributaries. New stakes have been driven on King Solomon Dome, where 2,500 ft. of tunnel was driven years ago. Experienced mining men of Dawson are in some of these enterprises, and some plan to put up small mills.

★Mayo silver-lead camp shipped only about 100 tons of ore in 1944, due to labor shortage and other war conditions. Clem Sinyard shipped 60 tons from his Galena Hill mine, and smaller shipments were made from the same district by Nels Bjonnes, Joe Fournier, and Alec Berry. From the Sadie, on Keno Hill, Billy Williams made one shipment.

MEXICO

No increase in taxes in 1945—Rail service improved—Labor Ministry renews safety drive

★Winter found mining in Mexico operating fairly satisfactorily, with production at a good level, mostly in lead, copper, and zinc. Labor disturbances were of minor importance. Mining and the government are much concerned about the postwar fate of the industry. Mining labor and the Ministry of National Economy, which has direct jurisdiction over the industry, are holding conferences to map plans intended to bring forth shock absorbers, chiefly in the form of keeping the mines going and enabling as much labor as possible to remain in service when peace arrives. Both anticipate a sharp decrease in exports, a prime factor for Mexican mining, when the war is over.

★Development works and explorations continue. The reported expenditure of $180,000(U.S.) in the latter activity in Durango is said to have been highly profitable for Mahomet Kader, Turkish mining operator. Reports are that he discovered a rich gold deposit about 150 miles from Durango City and is organizing a company to work it. Unnamed American interests are reported to be arranging a considerable

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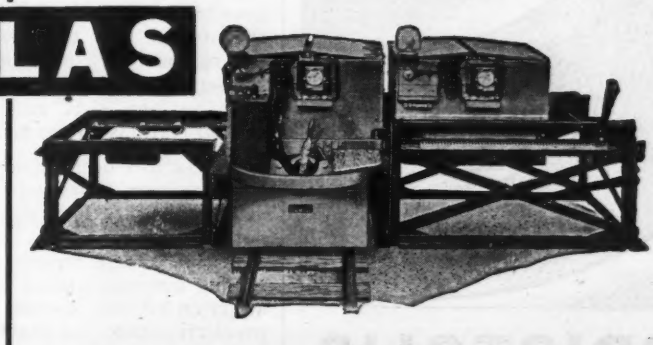

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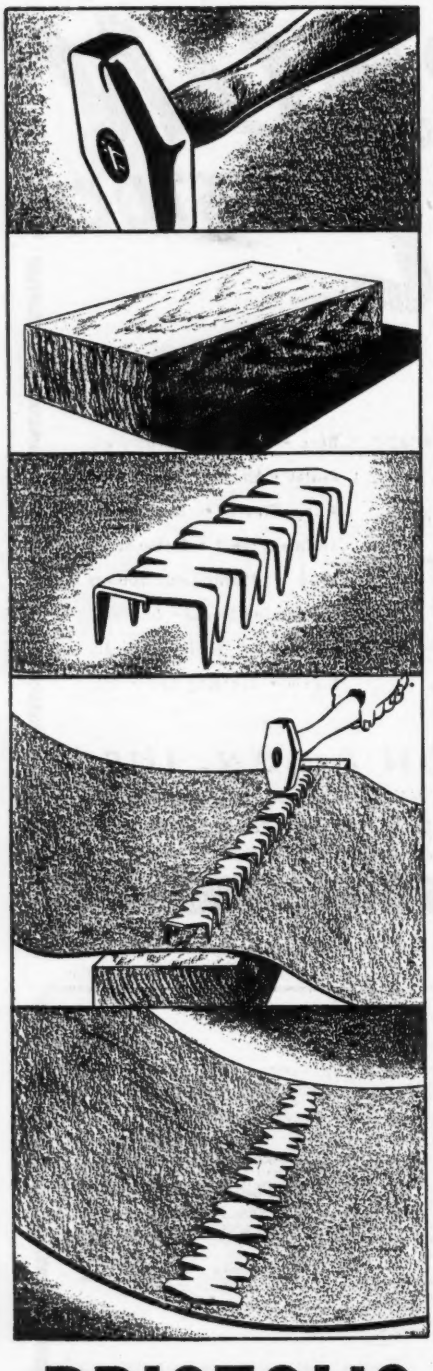

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Mexico *(continued)*

investment in explorations in the northwest, mostly in Sonora, and in the central region, chiefly Durango, Zacatecas, and Guerrero.

★Mexican lead exports to the U.S., below par for some time, now give signs of improving. No official figures are available on this movement, but it is said that improved market conditions and better rail transportation are bringing up this business.

★The Labor Ministry, expressing itself as being appalled by the shocking number of accidents in Mexican industry, due mostly, it has ascertained, to the workmen's carelessness, has intensified its campaign for safety first in industry, including mining. Employers, large and small, are cooperating in this drive to instill into industrial workers the merits of being careful, for their own good, that of their industry, and that of their country

★Mining presumably has been relieved of one of its major worries with the statement by Finance Minister Eduardo Suarez that there will probably be no new or increased federal taxes in 1945, though, he added, the government's New Year's expense budget will be 100,000,000 pesos ($20,650,000) less than in 1944, which was 1,100 million pesos, the highest Mexico has ever had. The Minister told of keeping down government expenditures in 1945 and asserted that, contrary to the practice in several years, including this one, the budget will definitely not be increased. He explained that anticipation of the war ending next year has obliged the government to budget its expenses on the premise that there will be less for the national treasury, because of decreased buying, including mining products, by the U.S. and other major United Nations governments.

★Mining had been anxious about prospective new taxes and increases in existing levies. That apprehension has now apparently passed for most of the industry, though reports are that gold-mining interests intend to ask for the abolition of the special tax on their production that was enacted some time ago as a substitute for the 12 percent excise impost on gold that was lifted. The gold men think that because of the dullness of the market for their product they should be relieved of the substitute levy.

★An odd sort of labor trouble confronts the Cia. Minera de El Boleo, S.A., Auguste Nopper, general manager, the French-owned copper mining company operating at Santa Rosalia, Baja California. Its longshoremen threaten to strike, contending that the company is not disposed to renew the contract it made with them in 1935 and which expires next year. The stevedores also charge that El Boleo is moving to oust them and hire other longshoremen to service the fleet of freighters it operates and which are based upon Santa Rosalia. Reports are that this company plans to suspend or at least sharply curtail its mining operations next spring, when the contracts expire for the sale abroad of much of its copper. This action, the reports say, is expected in March.

★The Public Mining Registry announces the listing from Sept. 1, 1943, to last April 30 of the record number of 2,708 mining exploitation concessions, permits for eight metal-treatment plants, franchises for 90 mining and allied companies, with a combined capital of 30,987,000 pesos, and the approval of 791 buying and selling contracts, leases, etc., in the industry, involving 5,877,400 pesos. During the year ended last Sept. 30, the Registry inscribed 3,348 mining concessions, 16 more than during the previous year term, 15 permits for treatment plants, an increase of seven over the former term; 108 mining and allied societies, with a combined capital of 42,928,100 pesos, 15,736,850 pesos more than the total capital of those registered in the previous year; and the approval of 1,100 buying and selling, leasing, etc., contracts, 84 over the former year.

★Chihuahua has set an example for other Mexican states by arranging self-help for miners who are incapacitated for their regular work for any reason. Governor Ing. Fernando Foglio, who took office recently, accepted the suggestion of eight Chihuahua sections of the national miners union that tracts of national lands in the state be provided such miners to establish themselves as farm colonists. The federal government, through the Ministries of Agriculture and Labor, is developing plans for like farm colonies on national lands in other parts of Mexico.

★Cia. Minera de Panuco, S.A., Mazatlan, Sinaloa, has advised the Labor Ministry that the strike against Wells Fargo has so crippled express service on the Southern Pacific Railway of Mexico that unless accumulated ore consignments can be moved promptly it will be forced to suspend work. With this exception, rail service for mining has generally improved of late. The National Railways has upped freight service to almost par by the employment of more rolling stock and train operation on better schedules. President Manuel Avila Camacho's threat to use troops to maintain smooth running of trains and work at depots and in shops, prompted by sitdown strikes, has had a wholesome effect. The National's employees told the President that calling out the soldiers would not be necessary as they intend to cooperate with him in providing Mexico with really good rail service.

★Kildun, Matehuala, San Luis Potosi, is having more trouble with its labor. The workers are indulging a series of sitdown strikes to force the company to obey the law enacted Oct. 1, 1943, which makes obligatory the raising of the daily pay of every contract employee in Mexico who earned less than 10 pesos. The employees told the Labor Ministry that the company has steadfastly re-

fused to obey this law. At present, Kildun is the only mining enterprise in Mexico that has this sort of labor trouble.

★Mining in southwestern Mexico is soon to have Salina Cruz, the principal port of the region, available for ore movement and the receiving of supplies by sea. The Marine Ministry has stepped up harbor improvements, including dredging and pier and warehouse building, with the intent to restore the port to first-class service. Salina Cruz has been in such bad condition for some time that only small vessels can reach its docks. The harbor is much obstructed by sandbars. The port is the western terminal of the transcontinental railroad, the Tehuantepec National Railway, crossing the Isthmus of Tehuantepec from Puerto Mexico on the Gulf Coast.

★The Labor Ministry is endeavoring to solve the acute economic problem for Guanajuato caused by the lay-off of more than 500 employees by Cia. Minera Pastitlan, S.A. (formerly the Consolidated Mining & Milling), at Guanajuato City. The workers contend that the company quit without warning. Other sources declare that the company, despairing of getting an answer from the Ministry to its written request to stop work, was obliged to close down because of its difficult economic position.

CHILE

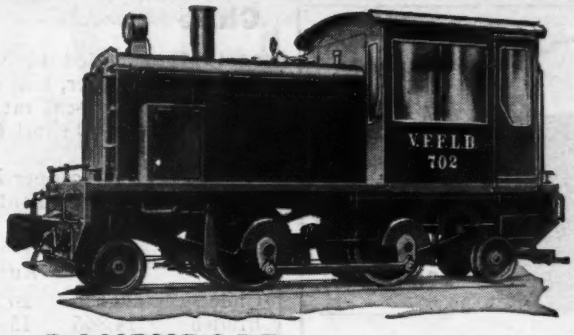
Mineral exports important in Chile's economy, yielding 83 percent of foreign exchange

★Bar copper output from the five companies that produce copper in this form continues at a high rate. During the first half of 1944 these five enterprises produced 236,555 metric tons of bar copper from the treatment of 16,687,000 tons of ore and concentrate. The average grade recovered per ton of ore treated, including the concentrates smelted at Chagres and Naltagua, was 1.42 percent copper. Highest grade belongs to the French smelters of Chagres and Naltagua, which fed to their reverberatories concentrates and ores averaging between 14.5 and 19.7 percent at Chagres and 10.3 and 13.0 percent at Naltagua.

Chile Copper Co. is treating ore around 1.9 percent; Andes, 1.19 percent in its concentrator and 1.12 percent in the leaching plants; and Braden, 2.2 percent copper.

The whole of Chile Copper's output is electrolytic; that of Andes is blister and electrolytic in the proportion of 62 and 38 percent, respectively. Braden copper is all fire-refined, and Chagres and Naltagua output is blister containing appreciable quantities of gold and silver from the high-grade gold ores and concentrates reduced with the main portion of the charge, which consists of copper concentrates.

Production for the first nine months



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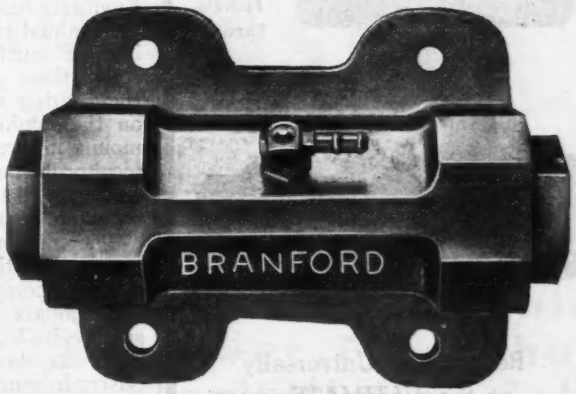

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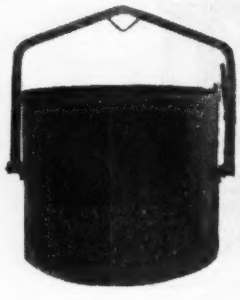

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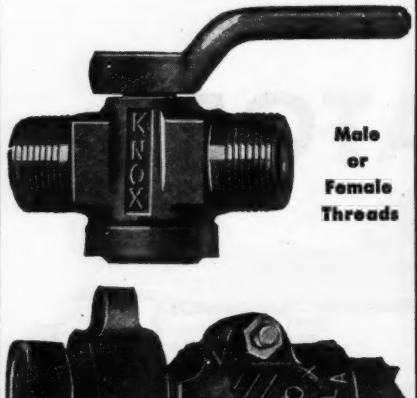

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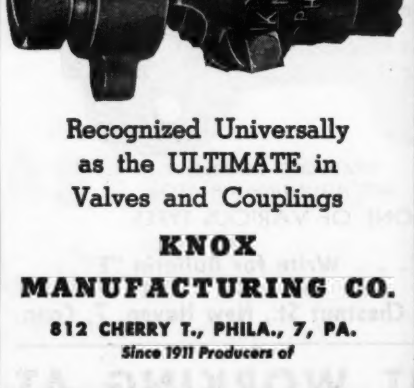

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Chile *(continued)*

of 1944 amounted to 364,451 metric tons of bar copper, and if output continues at the present rate it will reach a total of 550,000 short tons of copper in 1944.

Output of bar copper in metric tons for the last three months for which figures are available is as follows:

	July	August	September
Chile	20,646	20,230	19,787
Braden	14,866	15,453	13,176
Andes	6,973	6,970	6,171
Chagres	639	663	663
Naltagua	621	541	497
Total:	43,745	43,857	40,294
Ore treated Metric tons	2,990,473	2,852,615	2,723,843

Statistics prove that mining continues to be by far the main source of foreign exchange to this country. According to latest figures, dollar exchange to Chile is distributed thus:

	Millions of Dollars per Year	Percent.
American-owned porphyries	77	57.4
All other mining enterprises	19	14.2
Sodium nitrate	15	11.2
All other exports	23	17.2
Total:	134	100.0

This table shows that mining provides Chile with 83 percent of all foreign exchange and that any sensible curtailment in this country's exports of mineral products is bound to upset fundamentally its finances and economy.

★The Chilean Institute of Mining Engineers held recently in Santiago its first annual meeting, which was organized in much the same way as the conventions of the A.I.M.E. Since the bearing of the postwar problems on the mining industry is now paramount in everybody's mind, no technical problems were discussed. On the contrary, all sessions were given over to economic questions.

The meeting gave its unanimous approval to the proposal of raising the value of new domestic mined silver to 1.24 dollars per ounce and making silver coins legal tender at this value.

It was also considered that the industry in general, and copper mining in particular, deserves and needs government aid and protection. It was pointed out that whereas in Chile, agriculture, manufacturing, shipping, banking, railroads, insurance, etc., enjoy the State's help in the form of strong protective tariffs, subsidies, importation quotas, and so on, mining has to bear heavier taxation, heavier social security laws, and higher accident insurance rates without receiving any consideration at all. Thus, the mineral industry has been laboring under severe handicaps, until today the small and some of the large enterprises are threatened with extinction.

★Chile, like most Latin American countries, is suffering from severe inflation due to war conditions, which has made the cost of production soar to alarming figures. This inflation, however, is not affecting agriculture, manufacturing, railroads, coastwise shipping, etc., whose goods and services are consumed within the country, because these can and do pass the buck to the consumer. As already seen from the dollar value of Chile's exports, this country consumes within its own frontiers practically the whole of its agricultural products, except wool and manufactured goods. But all of its metallic mineral products have to be exported, and their prices cannot be raised to accord with cost of production.

To show how true these facts were, it was pointed out that the prices of cereals in Chile were 2.2 times higher than in neighboring countries; meats between 2.1 and 4.5 times; and that similar ratios held for iron and steel, clothing, shoes, cotton goods, and so on. Many mining supplies needed by the industry, such as trucks, tires, gasoline, machinery and spare parts, have to pay heavy import duties. As a consequence, salaries and wages have had to be raised to meet the increased cost of living, and the cost of mining has increased as much as 250 percent in the last four years.

It was also agreed that the country needed as a reserve for the State the gold placers, so as to be in a position to give work in them to the unemployed in case of a possible economic depression when the war is over rather than keep them on the dole; that it was necessary to increase the production of fertilizers and lime for the soils; that the railroads needed larger and more modern rolling stock for the transportation in bulk of ores, concentrates, fertilizers, cement, and lime, so as to lower transportation costs; that engineering curricula at the universities had to be brought more up to date and more attention given to physical culture to fit the mining engineer for a hard life under severe climatic conditions in the high cordillera or in unhealthy swamps; and, lastly, that it was indispensable to accelerate the geological mapping of Chile.

★The first meeting of the Pan-American Institute of Mining Engineering and Geology (PAIMEG) will take place in Lima, Perú, Dec. 2–10, 1945. As is well known, this organization, known in South America as the "Ipimegeo" (Instituto Pan-Americano de Ingenieria de Minas y Geologia) was organized and directed by the Institute of Mining Engineers of Chile during the First Pan American Congress of Mining Engineering and Geology held in Santiago, Chile, Jan. 15, 1942, organized by the same Institute. PAIMEG is authorized by the Chilean Government and the South American Union of Engineering Associations.

★A new cement plant is to be built at

La Serena, 280 miles north of Santiago, where there are large lime beds of marine origin. Production will supplement that from El Melon plant, midway between Santiago and Valparaiso, the two principal consuming centers. The latter is being enlarged, and the two plants will have a capacity of 700,000 metric tons of cement a year. The plant at La Serena will use the wet process, involving the flotation of the marine deposits. The complete plant was obtained in the United States. Power will be provided from waste gases. The plant will cost $4,000,000 and will start operations next July.

BRAZIL

Record production of charcoal pig iron, mica, and white arsenic mark mineral output

★Production of charcoal pig iron reached a new all-time high when a total of 130,218 tons was obtained in the first six months of 1944. In 1943 the production was 255,000 metric tons, with a consumption of 1,107,800 cubic meters of charcoal. It is believed that the country is actually the largest charcoal pig iron producer in the world. Twenty-nine blast furnaces with capacities ranging from 12 to 110 tons per day were in operation by June 20. The first coke blast furnace is the Volta Redonda plant of the Companhia Siderurgica Nacional, a 1,000-ton per day unit. This will be the first coke blast furnace ever built in Brazil and will utilize coke from native coal from Santa Catarina, Southern Brazil.

★Speaking before the Ohio Valley Section of A.I.M.E. Prof. Robert F. Mehl, director of the Metals Research Laboratory, Carnegie Institute of Technology, discussed metallurgy in Brazil. Dr. Mehl recently spent four months there lecturing at the Escola Politecnica of the University of Sao Paulo. He pointed out that the production of charcoal is not the serious problem one might expect it to be. Much timber is available, and the eucalyptus tree is a good producer of charcoal. Reforestation of an area can be accomplished in a period of about sixteen years. A eucalyptus tree would attain a diameter of 6 to 8 in. in six years. Growth of this kind is normal and would greatly aid the metallurgy of iron to offset the coal shortage.

★Although no figures have been disclosed by the Brazilian government agencies, it is believed that the production of mica reached a new record last year. A prominent mica producing district is the Governador Valladares area, Rio Doce Valley, Eastern Minas Gerais, and comprises some seventy mines, most of them in operation. This district is known for thick pegmatite veins which produce also substantial quantities of beryl, aquamarine, tourmaline, and rock crystal. Modern mining equipment and extensive mechanization

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Brazil (*continued*)

for stripping have been used for the first time by the U. S. Purchasing Commission to overcome the shortage of men.

★White arsenic production was 755 tons last year. The largest producer was St. John del Rey Mining Co., at Morro Velho, followed by Companhia Minas de Passage, Mariana, and by Companhia Brasileira de Mineracao, Caete, all in central Minas Gerais. Arsenious oxide is a byproduct of gold-milling operations, and is recovered from leached gold-bearing arsenopyrite ores. A new Cottrell precipitation unit is being installed at Morro Velho to improve the recovery of the fume. With some developments under way, it is expected that the production will reach 2,000 tons next year. White arsenic is used in the insecticide industry of Sao Paulo area to meet the requirements of the local market.

AFRICA

Oversubscription of Anglo American shares for Orange Free State development shows confidence in gold mining

★The Gold Producers' Committee has agreed, in response to representations by the mining unions' joint committee, to extend the period of the lump-sum payment from the Mines Provident Fund for three years from next January, when a system of pensions in place of the lump-sum payments was due to be introduced. The matter will be reviewed at the end of the three years.

It is understood that the Chamber of Mines was unable to agree to supplement the fund to increase the benefits due to members, as this would entail a large sum of money which the industry would not be able to bear. The meeting agreed that the question of placing the provident fund on a contributory basis should be deferred until the government's intentions on social security were known.

Since its inception in January, 1934, The Provident Fund has made payments as follows:—

	To Dec. 31, 1943			Totals to Sept. 30, 1944		
	No.	£	s. d.	No.	£	s. d.
Pension age	4,314	1,435,350.	7. 6	4,641	1,555,028.	17. 6
Incapacity	4,532	1,252,601.	19. 2	5,037	1,403,295.	4. 2
Death	2,852	321,581.	17. 3	3,087	357,416.	18. 11
Total	11,698	3,009,534.	3. 11	12,765	3,315,741.	0. 7

★There is a possibility of the corundum output of the Union being stepped up to meet the increasing demands of American war production. At the moment it would look as if the corundum industry is on the down grade. In 1942 the total production was 72,142 tons valued at £7,411. This figure dropped in 1943 to 53,214 tons valued at £4,707, and so far as can be ascertained shipments during the first half of the current year have been on about the same level as during the past year and were totally inadequate to meet the demands. The Transvaal supplies the bulk of the tonnage.

★One of the most significant evidences of sustained confidence in the gold-mining industry as the mainstay of the country's present and potential prosperity is furnished in the fact that the Anglo American Corp. was faced with the formidable task of returning nearly £3,000,000 to applicants for 500,000 shares at 25s. in the corporation's subsidiary Orange Free State Investment Trust, Ltd. It would appear that the total applications were for approximately 2,750,000 shares at 25s. each, a total value of £3,437,500. Deducting £625,000, which is the cost of the 500,000 shares, there remained a sum of £2,812,500 to be returned to the public in excess of the share issue.

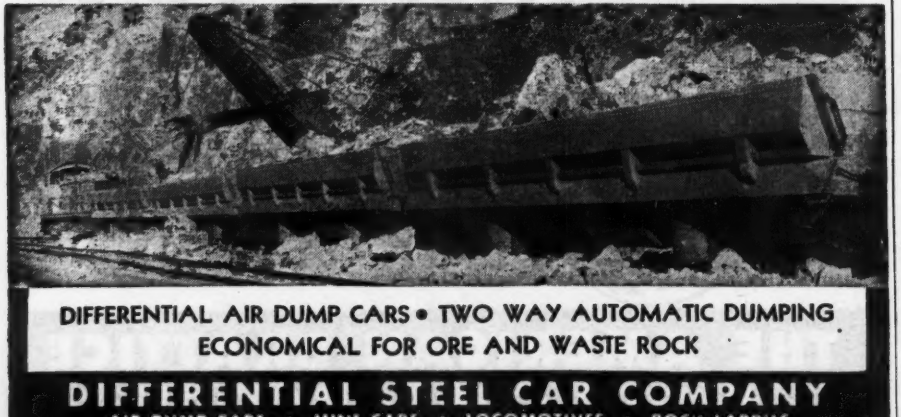
★The African & European Investment Co., in its latest report on drilling operations in the Orange Free State, states that in addition to four holes under the direction of Western Holdings, Ltd., drilling was actually in progress in 11 more holes, none of which had, at the time of the report, intersected a payable horizon. Of these 11 holes, 9 are actually going down on Block 7.

★The Minister of Mines, Colonel Stallard, has recently paid an official visit to the potential gold field in the Orange Free State. He inspected the scenes of activity in the well-known Odendaalsrust area and stated that he believed that the exploration there was in competent hands. The Free State fields, if they were developed, he added, would open a new chapter in South African history.

The famous Block 7, which has been so prominent in mining news, is the proved borehole area from which African and European Investment Co. has obtained promising results. It is here that the first mine will almost certainly be started. Although shaft sinking may not begin for some time, there is reason to believe that the flotation of the first African and European subsidiary may come early in the new year. In that event the company would be in a position to start work without delay, for the financial and administrative structure would already be in existence. The general supply position for materials and equipment would determine when actual work could commence; but it is understood that no effort is being spared to improve that position.

★Drilling to test the potentialities of the Kimberley Reef in the Nigel area has started. The first borehole being sunk by Sub-Nigel is down 1,763 ft. and at a depth of 745 ft. entered the upper portion of the Kimberley-Elsburg.

★For the first time since development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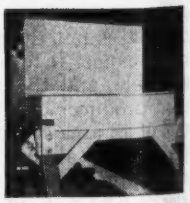
BURDEN BEARING LOCOMOTIVES • COMPLETE HAULAGE SYSTEMS
FINDLAY, OHIO

MERRICK WEIGHTOMETER
WEIGHS and RECORDS WITHOUT STOPPING

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The Merrick Weightometer provides a continuous, automatic accurate weight record while material is in motion on conveyor. It weighs without interrupting conveyor service.
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operations were initiated some three years ago, Blyvooruitzicht has failed to maintain the hitherto unbroken record of 100 percent payability. The September quarterly report shows that out of 6,225 ft. sampled, 98.4 percent was of a payable nature, the value being 59.5 dwt. over a width of 13 in. or 773.5 in.-dwt., compared to 729.4 in.-dwt. for the June quarter. The No. 2 shaft is now down to a depth of 3,504 ft.

Ore reserves as at June 30, 1944, are estimated at 2,677,100 tons, with a value of 15.4 dwt. This figure is exclusive of some 593,500 tons locked up in the shaft pillar, so that the total reserves stand at 3,270,600 tons with an average of 15.2 dwt. over 45 in.

★Remarks on the shortage of native labor are featured in all reports of various gold mining companies which have been recently published. The shortage is well illustrated by the appended figures as of Sept. 30 each year.

1941.....	363,077
1942.....	340,148
1943.....	295,699
1944.....	289,672

During October of 1944 the number decreased a further 1,484 on the gold mines and 200 on coal mines since August.

★An underground fire, recently started in the timber support of a stope in No. 2 shaft section of the Van Dyk Consolidated, made it necessary to withdraw all employees from the mine. In the course of this a number of persons were affected by gas and one native was fatally gassed. During the work of extinguishing the fire, rendered difficult by the dense smoke, the leader of a Proto team from the City Deep got into difficulties through exhaustion. In going to his assistance, the underground manager and the assistant underground manager were also overcome by gas, and all three lost their lives.

BOLIVIA

Patino installs sink-float plant—Trial runs of pilot plant using Tainton process

★Patiño Mines & Enterprises Cons., Inc., largest single tin producer (21,425 metric tons in 1943), is installing at its Catavi concentrator a sink-and-float plant which was to have been put in operation late in December 1944. The plant, designed by the Sink and Float Corporation, will replace the present hand-picking plant and will also treat accumulated tailings.

The new plant will have a normal capacity of 5,500 tons of ore per 25 hours. The heavy-density medium will be galena, which is to be recovered later by flotation. Some of the advantages of the new installation are its flexibility for adapting itself to a wide range of grade of feed and of products, much less labor for sorting ore, and the possi-

Steelcar Steelcar

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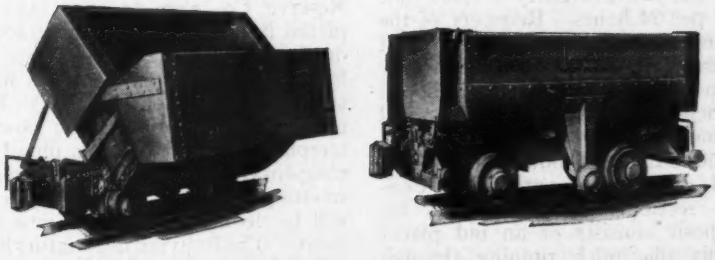
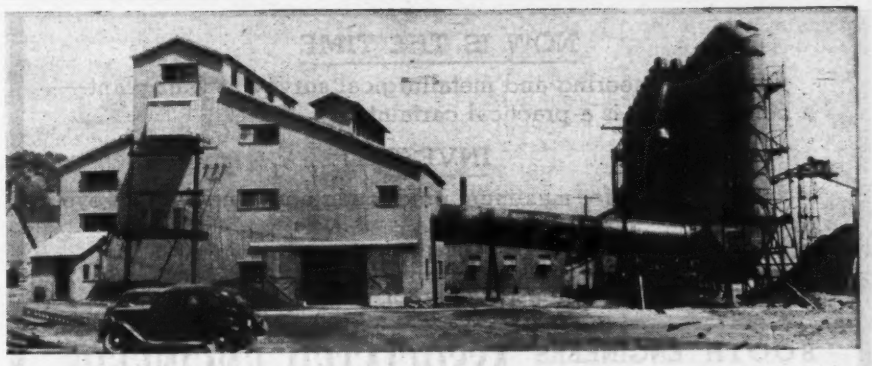


PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.



Norblo Offers Practical Help in Dust Control

•

The performance of Norblo Automatic Bag Type Collection of metallurgical and chemical fumes and dusts will have important bearing on post-war processes and plant design. In the handling of large volumes of high temperature fume and especially in continuously maintained high efficiency of collection Norblo recent installations have made outstanding records. This experience plus Norblo engineering can be applied in existing as well as in new fields, to obtain guaranteed results which lower costs while at the same time increasing or improving production. If you have a dust or fume situation which could be better controlled let Norblo engineers look into it.

Norblo
DUST COLLECTION SYSTEMS
THE NORTHERN BLOWER COMPANY
6410 BARBERTON AVENUE CLEVELAND 2, OHIO

Bolivia (*continued*)

bility of treating mine ore or tailings which, because of their grade or size of particles, could not be worked by the old hand method. The Patiño plant is the second of its kind to be installed in Bolivia. For four years a smaller sink-and-float plant has been in operation in Colquiri, a tin mine of Mauricio Hochschild, S.A.M.I. group.

In the Catavi mill, also, a section of Sullivan deck tables is being installed to treat the very fine slimes that now go to tailings. The new plant is equipped with 15 5-deck tilting slimers, with 6x6-ft. decks covered with rugged rubber matting, and a 60-ft. Dorr thickener. The rated capacity is 1,000 tons of feed per 24 hours. Recovery of the tin from slimes is one of the greatest problems for which no satisfactory solution has been found. It is hoped that these newly designed tables will give good results.

Patiño Mines is now operating a ¾-cu.yd. dragline excavator in its Centenario section. The Centenario tin ore deposit consists of an old placer that fills the gulch running through the Patiño properties, enriched by the tailings from old concentration plants in the district, which eventually reached the gulch. The mill to treat this ore is being enlarged and modernized, and is expected to yield about 50 tons of tin per month.

★The 250-ton Tainton process pilot plant that Mauricio Hochschild S.A.-M.I. completed two months ago at its Unificada property, in the famous Potosi hill, for the treatment of low-grade and complex tin ores, is being given trial runs. The reports are encouraging. If this pilot plant proves a success, being the first to apply pyrometallurgy and electrostatic methods together for the concentration of tin ores, it will open great possibilities for Bolivia's tin industry, now handicapped by high operating costs.

★News from Washington is that the negotiations to readjust the price of tin ores and concentrates that Bolivia sells to the United States under the contract signed in 1940 with Metals Reserve Co. were to have been completed last month. The contract ends on June 30, 1945. The present price is based on 60c. per pound of fine tin contained, f.o.b. South American Pacific ports. The negotiators are now contemplating a price of 63½c. plus 11c. to compensate for part of the increase in smelting charges and penalties that will be deducted under the new agreement. The Bolivian negotiators having failed in their main objective, which was to extend the term of the contract so that long-term investments could be made, the attention of the industry is now centered in the revision of the price, hoping that a fair share of the increase would go to the producers. Against this are the official statements made by the present Bolivian Ambassador in Washington and former Secretary of Labor, who promised mining labor to give the whole increase to them. Apart from the raise of wages that the higher price of tin will bring about, the workers have launched a general demand for another independent increase of wages.

★The Bolivian Congress has just cancelled the main clauses of the contract that Compagnie Aramayo de Mines en Bolivie signed with the government in 1937, to explore and mine for 25 years the gold placer deposits of the Tipuani region. Compagnie Aramayo spent nearly $2,500,000 (U.S. Cy.) in exploration and equipment. Although it is only about 60 miles from La Paz to Tipuani, so far there is not even an automobile road connecting the two points, due to the mountain ranges the road would have to cross. Cie. Aramayo built landing fields in Tipuani and Guanay, and had a fleet of planes with which it transported labor and nearly every bit of the materials and machinery for the operation. Even though Tipuani is considered the richest known gold deposit in Bolivia, several ventures to work it on a large scale have failed and considerable money has been lost. There were great hopes that the efficiency and financial strength of the Aramayo company would make Tipuani an industrial success. However, the dredges ordered from the United States could not be had until the termination of the war, and now the action of Congress is bound to discourage Aramayo's efforts, as well as other capital investments.

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PERU

Dedicate Banco de Minero's coal mine at Oyón—Interest in gold mining grows

★On Oct. 19, the Banco Minero del Peru officially inaugurated its installations at Oyón, with Dr. Manuel Prado, president of Peru, as guest of honor. The party left Lima at 5 a.m. and, after a brief visit and a banquet at the mining camp, near the town of Oyón (elevation 13,500 ft. above sea level), returned to Lima at 9 p.m. Present were Messrs. Eulogio Fernandini and Juan L. Uccelli, chairman and general manager, respectively, of the Banco Minero; Carlos Sayan Alvarez, speaker of the house of representatives; Carlos Moreyra, minister of railroads and public works; Donald H. McLaughlin, general manager of Cerro de Pasco Copper Corp.; and Artidoro Alvarado Garrido, director of mines. At the banquet there were about 130 people, but at the camp workers and visitors numbered nearly 2,000.

★The Oyón project was started by the Banco Minero in July of last year with the idea of developing and exploiting bituminous coal on a coöperative basis, and coking the greater part of the production for the benefit of the poorer classes for cooking and heating. The

region had been worked on a small scale for about 40 years, but production never amounted to more than a few tons a month, mainly because transportation was difficult, there being no commercial road to link Oyón either with the Coast or the Sierra. At present the old road from the Coast, which has been repaired, allows better transportation. For the exploitation of the coal seams, the Banco Minero drove a large tunnel that has already advanced over 1,000 ft., having cut 12 seams, of which at least 8 appear to have commercial possibilities. The Banco is also installing 10 coking ovens, of which 3 are already in production.

Oyón coal is good grade bituminous and makes a very light, easy-to-burn coke, suitable for domestic uses. Its average analysis is:

	Percent
Fixed carbon	67
Volatile matter	16
Ash	14
Moisture	3

★After experimenting a great deal the Banco Minero has ordered from the States a cleaning plant of the latest design, which includes a hydrotator and drying equipment. With proper washing it is expected that the ash content of the coal can be lowered to about 4 percent. The coal properties at Oyón are owned by small miners; exploitation and marketing will be on a coöperative basis, with no profit to the Banco. This is the first time in Peru, and probably in South America, that a mining proposition has been undertaken with this viewpoint.

★Non-metallic mining has grown notably in Peru in the last few years. Previously the only non-metallic mining industries in existence were cement and gypsum plants. At present there are at least two glass factories, which make practically everything from bottles to fine glassware; kaolin is also being exploited by two firms which manufacture porcelain; one firm makes a very good type of firebrick; and a plant for the manufacture of white cement is contemplated. Graphite is being worked near Trujillo, and asbestos, only a few hours from Lima, and talc is being produced in Tarma and Huánuco. The mica industry, although it has not progressed as satisfactorily as expected, is also doing well.

★In view of the favorable outlook for gold, there is a great deal of interest in mining circles to develop new regions. First in line are the traditionally rich placers east of the Andean ranges, especially in the provinces of Sandia and Carabaya in southern Peru. Placer mining has never been tackled in large scale in Peru, mainly because of the difficulty in reaching the jungle plateaus. However there are at present several companies, notably Chabuca andAporoma, which are making good profits hydraulicking those rich placers. On an average gravels in Sandia carry about 30c in gold. Although rain is very abundant there, it is expensive and difficult to control water supplies, ditches being expensive to build.

Reflections (*continued from p. 89*)

Even high-cost aluminum from such locations was preferred to shortages.

The above figures do not include overhead expense, interest on either working capital or government investment, nor any of the customary private company costs such as taxes, sales expense, return on capital, or profit. In other words, these data are not really comparable with figures of privately owned establishments; nor, officials warn, should they be assumed to mean that the metal could profitably be sold to anybody at the figures indicated.

Cost of Alumina

Alumina has been manufactured for the government in two very large plants owned by Defense Plant Corp. at Baton Rouge, La., and Hurricane Creek, Ark. The rated capacity of these establishments is one billion and one and one-half billion pounds per year, respectively. During the months of greater activity these plants operated above 70 percent of their rated capacities. Under those conditions the cost of production was significant; and the resulting cost figures available from DPC are of interest.

The principal difference in costs at the two establishments when operating at comparable rates was due to the cost of the bauxite delivered to them. This is evident from the following data now available from the two plants for a nine-month period when operations were at or near 70 percent of capacity:

Costs in Cents Per Pound of Alumina

	Ark.	La.
Bauxite	1.46	0.62
Direct labor	0.14	0.09
Lime and soda ash	0.34	0.61
Fuel and power	0.09	0.09
Repair and maintenance	0.16	0.09
Depreciation	0.11	0.08
Other items	0.18	0.10
Total	2.48	1.68

In addition to these direct costs there were also general overhead expenses and interest on both working capital and on government investment. There were no payments of taxes of local, state or federal nature, nor any charges for capital account, sales expense, or profits. All of those facts must be taken into account in comparing these data with any commercial figures. Comparable figures for the privately owned plants of Alcoa are not available.

Good Level Expected in Non-metallic Fields

Production of non-metallic minerals during 1945 is expected to exceed the 1944 figure even of those minerals where some difficulties were encountered last year. However, there are two factors which will have adverse effects, the shortage of large truck tires and the difficulty of securing adequate labor.

The production of talc is particularly dependent upon these two factors. California talc produced in Death Valley must be trucked to the railhead; consequently, the tire problem is very acute. The production of fibrous talc in New York will probably suffer from lack of labor rather than tire difficulties. In the case of both types of talc, milling capacity and ore reserves are considered ample for a production increased somewhat from 1944 figures. Fluctuating military requirements have caused temporary shortages and may contribute to occasional tight supply situations.

The production of talc crayons during 1944 did not meet requirements due to shortage of manpower and also to lack of ore suitable for sawing. Crayons manufactured from compounded bodies, mainly powdered talc, have now been approved as satisfactory for metal marking and should relieve the shortage of natural crayons.

The supply of block or lava-grade talc during early 1944 was very tight. This situation has been relieved both by decreased requirements of the services for vacuum tubes and by the development of substitutes for the block talc. The total production of block talc is relatively small compared to other minerals. It is probable that a market for all good-quality block talc produced can be expected for some time to come.

Bentonite production during 1944 continued steady, with all facilities operating at capacity. There is no cutback in sight for bentonite as a component of synthetic molding sands for steel castings, nor is there any prospect that requirements for oil-well drilling muds will decrease significantly. Due to the need for truck hauling of bentonite from pits to processing plants, the shortage of truck tires threatens to make capacity production difficult.

The use of diatomaceous earth as a filtering agent is steadily increasing, and producing facilities are expected to operate at capacity during 1945. The labor supply has been short but not sufficiently to affect production seriously.

Pyrophyllite production during 1944 was insufficient to supply the requirements of important war programs in addition to normal industry demands, and the use of substitute materials became necessary. Due to the expansion of production facilities, this situation is not expected to be repeated in 1945.

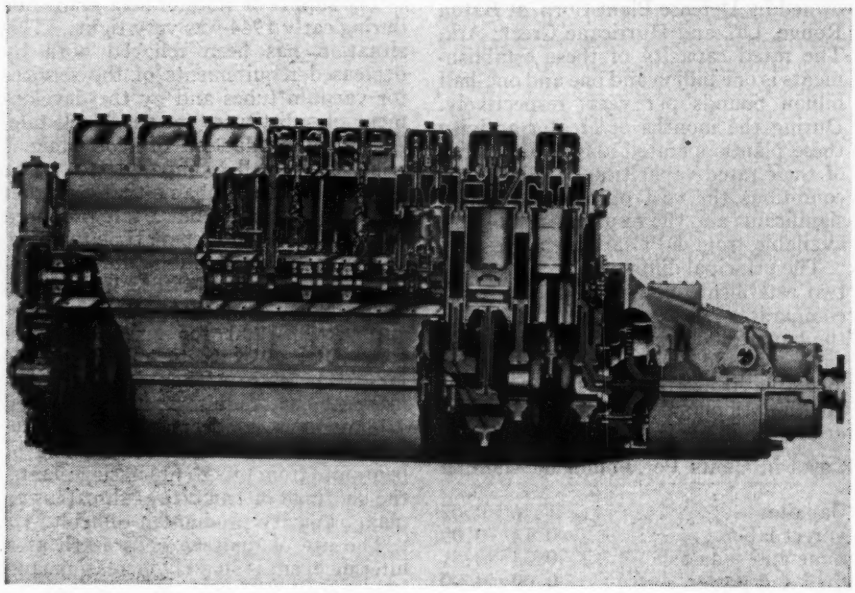
Pyrophyllite is reported to be a most efficient carrier for rotonone, pyrethrum, and D. D. T. chemical in the manufacture of insecticidal dust. Its use in this application will probably increase when the active ingredients become available.

The 1944 production of feldspar had been expected to decline rather seriously because of a shortage in mine labor and the consequent depletion of crude stocks at the grinding mills. Producers, however, managed to grind approximately the same tonnage in 1944 as in the preceding year. Additional quantities could have been sold to the glass industry had supplies been available. Milling capacity of the industry is reported to be ample for present requirements. These facilities will be increased upon completion of a new flotation mill now being built in North Carolina, which is expected to begin production about February.

EQUIPMENT NEWS

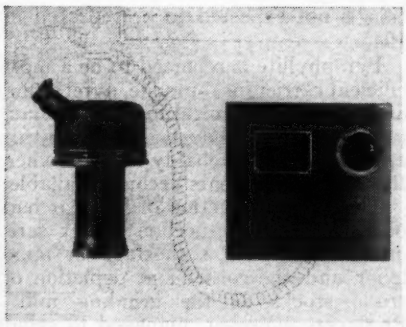
Diesel Engine Line

A new line of diesel engines ranging from 250 to 650 hp., and known as the Sterling Viking, is announced by the Sterling Engine Co., Buffalo, N.Y. As illustrated herewith the engine is of conventional type—4 cycle, multiple cylinder, inline, completely inclosed. The manufacturers claim that it provides a power plant with the same overall dimensions and weight as most gasoline engines of equivalent horsepower. Fuel consumption is said to be considerably less than in gasoline engines. The line is offered for a wide range of uses in the mining industry.



Level Float Control

Hancock Valve Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., announces a new level control which is said to give accurate and dependable results within a fraction of an inch. The control, illustrated herewith, is free from electrical switching or contacts within or without the float chamber, and there are no levers, linkages, bellows, or other wearing parts. The level of the liquid can be raised or lowered by adjusting a screw.



Solder for Aluminum

A free-flowing solder, EutecRod 199, has been developed by Eutectic Welding Alloys Co., New York 13, N. Y., for use as a seal on sheet aluminum that has been lock-seamed, or lapped and spot-welded or riveted. The manufacturer states that the new solder will flow on aluminum as readily as ordinary lead-tin solder on tin-plate, brass, or copper. It will also work on cast aluminum. It is suitable for applications that will not be heated above 212 deg. F. under working conditions.

Chemical Wood Preserver

To control or eliminate dry rot, fungi, and molds in wood, Quigley Co., Inc., New York 17, N.Y., has developed Triple-A copper naphthenate preserver which can be applied by brush, spray, or dipping and is said to seal wood against destructive organisms. It is non-poisonous to humans and will not bleed through when light-colored paints are applied over the wood preserver.

Bucket Lubricator

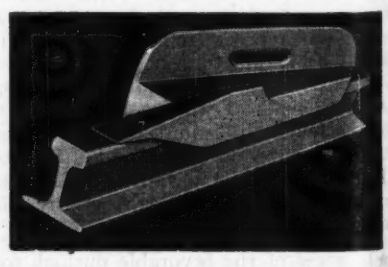
Gray Co., Inc., Minneapolis, Minn., offers a new bucket pump called the "Block Buster" for lubricating trucks and machinery designed to handle heavy-duty lubricating jobs easily and quickly. A few of its important features include an easy operating double-acting pump developing 4,000-lb. pressure; hardened-steel precision-ground piston; simple positive foot valve; 18-gage seam-welded container with ingenious pump support bracket which keeps the pump from being completely removed when filling; and a strong carrying handle which acts on a large stud bolt to hold the cover and pump in position on the container. The conical-shaped hopper bottom automatically feeds all the lubricant in the container to the foot valve and is said to prevent channeling and loss of prime. Folder BB-664P describes this unit.

Improved Welding Goggle

American Optical Co., Southbridge Mass., announces an improved A0 Duraweld welding goggle that is said to provide better protection and greater comfort for welders' eyes. Eyecups are anatomatically molded for right and left eyes and have rounded edges to fit the contour of the face. Side shields provide increased ventilation and help to prevent fogging of the lenses. A variety of lenses can be used to meet working conditions.

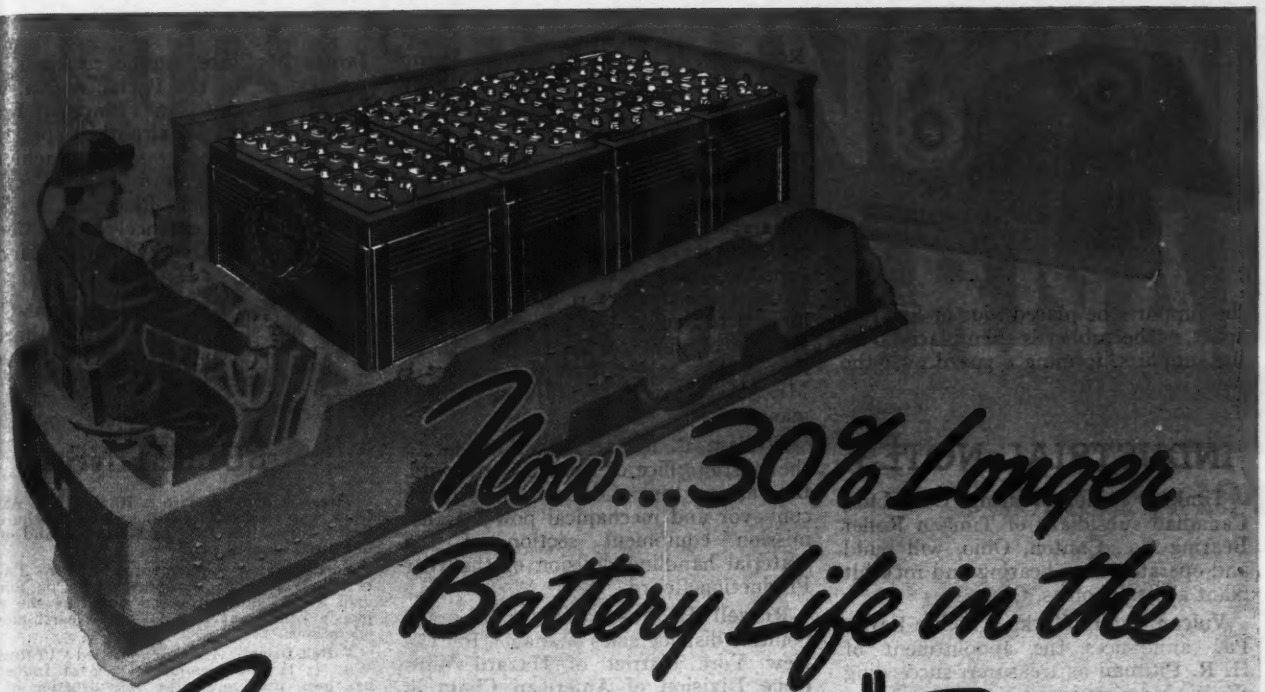
Mine Car Derail

In an effort to reduce haulage accidents, the Portable Lamp & Equipment Co., Pittsburgh 19, Pa., has designed a derail that operates like a switch and eliminates the danger of car wheels jumping over the device. It is simply installed by placing the derail on the rail and tightening by means of a roller binding on the rail head. It is easily released by kicking in the opposite direction.



Trolley Guard Support

Electrical injuries underground may be minimized by the use of a trolley guard support developed by the Mosebach Electric & Supply Co., Pittsburgh 3, Pa. Made of two pieces of lead-coated steel bolted together, the support is designed to grip the trolley wire as illustrated. It is recommended that



Now...30% Longer Battery Life in the New PHILCO "Thirty"

Post-War Planners—Please Note

Be sure to include the new Philco "Thirty" when considering all future purchases of mine locomotive and shuttlecar batteries. In the years ahead, this revolutionary new long-life construction, with FABRICATED INSULATION*, developed by Philco Research, will save you dollars in depreciation, up-keep and replacement costs. It's your post-war battery—available now in certain types and limited quantities. Write today for complete information.

**Patent applied for.*

PHILCO CORPORATION
Storage Battery Division, Trenton 7, N. J.

A

Note absence of sediment

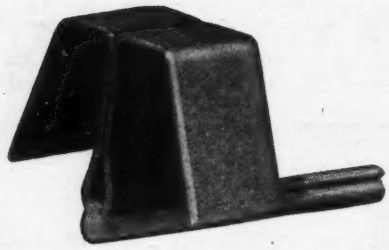
UNRETOUCHED PHOTOGRAPHS

of Philco "Thirty" (A) and Conventional Type (B) cells at conclusion of accelerated life test, in motive power cycle service, charged and discharged in series, in the same circuit. Note sediment space; Philco "Thirty" is clear; Conventional cell is filled.

B

Note sediment

For Fifty Years a Leader in Mine Storage Battery Development



the supports be placed four or five feet apart. The rubber is then placed over the supports, forming a guard over the wire.

INDUSTRIAL NOTES

Timken Roller Bearing Co., Ltd., Canadian subsidiary of Timken Roller Bearing Co., Canton, Ohio, will build and operate a new bearing and rock-bit plant at St. Thomas, Ont.

Vulcan Iron Works, Wilkes-Barre, Pa., announces the appointment of **H. R. Pittman** as treasurer, succeeding W. W. Moss, resigned.

James A. Lane, formerly associated with Joshua Hendy Iron Works and Oliver United Filters Corp., has been appointed western sales manager of the **General American Process Equipment Division of General American Transportation Corporation,** with headquarters at the Chicago, Ill., office.

Dean Swift, formerly of Seattle, has opened offices in New York 17, N.Y., to represent **Western Gear Works,** of Seattle, and the company's associate plant, **Pacific Gear & Tool Works,** of San Francisco.

Frank Gawan, formerly connected with the Denver Fire Clay Co. in Denver and Salt Lake City, has joined the staff of **Joy and Cox,** Denver, Colo., to represent a number of manufacturing concerns catering to the mining industry.

Kurt W. Jappe, manager of detonator operations, **Hercules Power Co., Wilmington, Del.,** has been appointed treasurer of the American Society of Mechanical Engineers.

Diesel Engine Manufacturers Association recently re-elected **Robert E. Friend,** president of Nordberg Manufacturing Co., as president. **E. J. Schwanhausser,** vice president of Worthington Pump & Machinery Corp., was elected a vice president; and **Robert H. Morse, Jr.,** general sales manager of Fairbanks, Morse & Co., was reelected treasurer.

Olin Industries, Inc., has been organized as a parent company of all industrial enterprises formerly conducted by Western Cartridge Co. and the Olin Corp. The new corporation will operate, among other units, the **Aluminum Division,** Tacoma, Washington, and **Kalunite, Inc.,** Salt Lake City, Utah.

Army-Navy "E" award for high achievement in war production has been made to **A. Leschen & Sons Rope Co.,** St. Louis, Mo.; **Carboloy Co., Inc.,** Detroit, Mich.; **Bausch & Lomb,** Rochester, N.Y. (sixth); **Aurora Pump Co.,** Aurora, Ill. (second); **Davey Compressor Co.,** Kent, Ohio (third).

R. M. Magraw, who has been manager of **Potash Company of America,** Carlsbad, N.M., since its beginning, has retired from his administrative connection with the company, but will still be associated in an advisory capacity. **R. A. Pierce,** who was to have succeeded Mr. Magraw, was obliged to decline the deserved promotion on account of his health. **K. F. Peters** has taken over the duties of Mr. Magraw, with the title of resident manager.

William B. Mercer has returned to the Boston office of **Robins Conveyors, Inc.,** after a tour of duty as chief of the conveyor and mechanical power transmission equipment section of the material handling division of the War Production Board.

Russell H. Foss was recently appointed district sales manager for the New York district of **Hazard Wire Rope Division of American Chain & Cable Co.**

Walter A. Furst has been appointed district representative in the Pittsburgh area for the storage battery division of **Philco Corp.,** with headquarters in the Oliver Bldg.

Lincoln Electric Co., Cleveland, Ohio, has awarded prizes aggregating $4,750 to 15 employees, winners in a postwar planning competition. Prizes ranged from $1,000 to $100.

Vanadium Corporation of America has appointed **John B. Girdler** to be sales manager of the eastern district, with headquarters at the company's office, New York 17, N. Y.

C. Leslie Jamison has been appointed vice-president in charge of sales for the **Strauss Company** Division of **Portable Lamp & Equipment Co.,** Pittsburgh, Pa., manufacturing accident-prevention equipment.

Carborundum Co., Niagara Falls, N. Y., announces the appointment of **F. Jerome Tone, Jr.,** as vice president in charge of sales, succeeding senior vice president **Charles Knupfer,** who has been assigned to special sales and executive activities. **Vice president H. P. Kirchner** will be in charge of production, and **Otis Hutchins** has been named technical director in charge of research and process control and development.

Robins Conveyors, Inc., Passaic, N.J. has announced a "3-P" plan—"Prior Preference Protection—for placing orders now for conveyor systems and other Robins products for postwar delivery. Complete information on request.

Larry E. Gubb, chairman of the board of directors of **Philco Corp.,** has been elected to the Board of Trustees of Cornell University for a term of five years. He is also President of Cornell's Alumni Association.

Allis-Chalmers Mfg. Co. has announced the following appointments: **James McClure,** public relations representative for the Pacific region, with headquarters at San Francisco; **Frank Sullivan** and **E. J. Baireuther,** specialists in crushing and mining machinery, for the Seattle and Denver offices respectively. **S. L. Eastman** has been appointed chief engineer of the **Cleveland Worm & Gear Co.,** Cleveland 4, Ohio.

G. W. Van Keppel Co., Kansas City, Mo., has been appointed authorized distributor in that territory for **Euclid Road Machinery Co.,** Cleveland 17, Ohio.

BULLETINS

Tires. Goodyear Tire & Rubber Co., Akron, Ohio, has published an illustrated brochure on heavy-duty tires for earth-moving and other industrial equipment.

Earth-moving Equipment. Bulletin TA-425 of the Wooldridge Manufacturing Co., Sunnyvale, Calif., illustrates and describes the company's equipment for high-speed earth-moving operations.

V-Belt Drive. A booklet entitled "19 Reasons Why It Is the Dominant Drive of Industry" has been prepared under the direction of the Engineering Research Committee of the Multiple V-Belt Drive Association, Chicago 3, Ill.

Mining Sheaves. An 8-page catalog, No. 446, by the Lake Shore Engineering Co., Iron Mountain, Mich.

Ore Car. Lake Shore Engineering Co., Iron Mountain, Mich., has published catalog No. 448, describing "Lohed" cars for hauling ore and rock.

Repairing Electric Lines. B. F. Goodrich Co., Akron, Ohio, has issued a folder on the Punch-Lok method of connecting, splicing, reinforcing, and repairing electric lines.

Dump Trailers. Euclid Road Machinery Co., Cleveland 17, Ohio, has issued Form 500 illustrating and describing Model F Euclid chassis, used as a tractor for Easton side-dump trailers.

Corrosion. International Nickel Co., New York 5, N.Y., has issued a 54-page brochure analyzing corrosion principles for the practical man as well as the technologist in the metal industries. Tables list nearly 500 typical corrosives in which nickel-alloys have been successfully used.

Industrial Timer. Paragon Electric Co., Chicago 5, Ill., has published Bulletin 4492, describing a new development in automatic electric timers for industrial operations.

Electric Distribution Box. Bulletin No. 780M of Ohio Brass Co., Mansfield, Ohio, illustrates and describes Type LG distribution box for 250 and 550 volts d.c., approved by the U. S. Bureau of Mines.

Acetylene Generators. Air Reduction Co., New York, 17, N.Y., has published a bulletin on portable and stationary acetylene generators.

Lighting Maintenance. Westinghouse Electric & Manufacturing Co., Edgewater Park, Cleveland, Ohio, has prepared a pamphlet on the maintenance of lighting facilities in industrial plants.

Welding Electrodes. Page Steel and Wire Division of American Chain & Cable Co., Monessen, Pa., has recently issued an informative book on Page-Allegheny stainless steel welding electrodes.

Mining Equipment. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., has published Bulletin No. B6166C, covering its entire range of products for the mining and treatment of metallic ores and non-metallic minerals.

Refractories. Harbison-Walker Refractories Co., Pittsburgh 22, Pa., has published an eight-page bulletin on its line of furnace refractories and insulating materials for metallurgical and industrial plants.

Couplings. Philadelphia Gear Works, Inc., Philadelphia 34, Pa., has published Bulletin No. 150 on its line of couplings.

Paints. Protective coatings for industrial applications, made by the Quigley Co., Inc., New York 17, N.Y., are described in catalog No. 377.

Electric Controls. Electric Controller & Mfg. Co., Cleveland, Ohio, have issued Booklet 1041, describing its neo-time-current accelerating units and starters.

Circuit Breakers. Bul. 4408 of I-T-E Circuit Breaker Co., Philadelphia 30, Pa., is devoted to instructions for keeping air circuit breakers in trim.